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MINING AND SCIENTIFIC PRESS.

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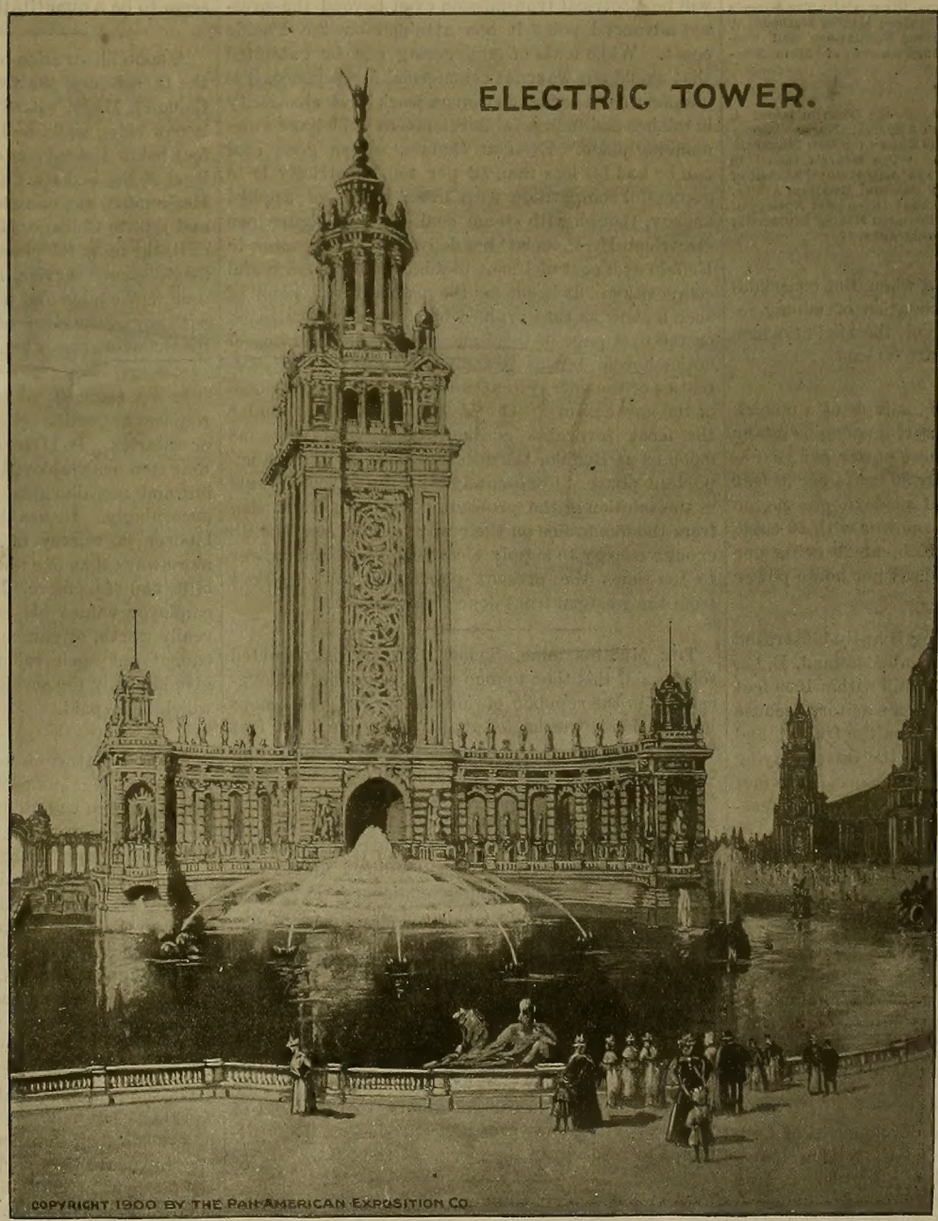
Electric Tower at Buffalo, N. Y.

Those who saw the electric tower at the Chicago Exposition in 1893, or the one at the San Francisco Midwinter Fair in 1894, were greatly pleased with the charming effect either one produced. At the Pan-American Exposition, to be held in Buffalo, N. Y., this year, it is intended to have an electric tower that will fittingly typify the beauty thus made possible and the advance in electrical science. A view of the tower appears herewith. It is intended to be the central and crowning figure of the electrical display. The height of the tower is 375 feet above the surface of the broad basin in which it stands, looking down upon the Electricity Building on the west. It will be noted that the tower is flanked on the east and west by long curved colonnades, which sweep to the southward and terminate in airy pavilions, forming a semicircular space 200 feet across. Within this space, and in a high niche in the main body of the tower, are cascades; about the basin are leaping jets and countless figures, each with its spurt of water. At the center of the niche is a tall geyser fountain, whose waters find their way from the high basin within the niche over successive ledges and among a multitude of vases to the level of the pool.



The main body of the tower is 80 feet square. From the surface of the water to the top of the colonnades is 75 feet. The shaft of the tower is treated with great simplicity. The center of each side is paneled with fantastically perforated work, through which is indistinctly revealed the massive framework of the tower. This feature is calculated to produce a remarkable effect when lighted from within, as it is the intention to do. The main shaft of the tower terminates in an elaborate entablature at the height of 200 feet. The crown of the tower rests upon this entablature, and is composed of three stories of diminishing proportions and varying design. The lower of these stories is an arcaded loggia, rich in ornamentation and having the wall surfaces brilliantly colored. Pavilionettes at the corners terminate in light fantastic cupolas. The second stage, or lantern of the tower crown, is in the form of a high, circular colonnade, entirely open, so as to allow the effect of the sky to be seen between the columns. A spiral staircase within the colonnade leads to the last stage of the tower—the cupola, over whose soaring dome is poised the figure of the Goddess of Light, in hammered brass, thus dominating the entire Exposition, which owes so much to her generously exerted power.

The entrance to the tower is across an ornamented bridge from the plaza, on the north side. Elevators will carry passengers to the various floors. From the cupola the eye can sweep the Niagara frontier, and look into Canada, beyond the river that separates that country from the United States.

Sculpture plays an important part in the decoration of the tower. Two monumental groups of statuary flank each of the four sides of the base. Above the water niche in the southern face of the tower is an escutcheon, representing the arms and seal of the United States. In the spandrel of the arch above the niche are sculptures in relief.

The pavilions and wings are also decorated with sculpture and architectural devices. The entire exterior of the tower will be studded with myriads of electric lights, so arranged that a great variety of effects can be secured. The use of electric lights in combination with the sparkling fountains and cascades will produce a fine effect.

The electricians at the Pan-American Exposition have the responsibility of intending to present to the world the most elaborate electrical effects ever fashioned by the human hand, and are dealing in large figures. Contracts have been made for the delivery of 5000 H. P. from the electric power plants at Niagara Falls. This will require the special construction of a transmission line connecting the Exposition with the main transmission line of the power company. The 10,000 volts will be transmitted by bare copper cables of nineteen wires each, strung upon insulators, 10 inches in diameter, placed upon high poles. The reception of this volume will give an opportunity for the exhibition of various step-down transformers which will reduce the voltage to various units that will permit its use for power and light. Besides the 5000 H. P. received from Niagara Falls, about 4000 H. P. will be generated upon the Exposition grounds by means of gas engines of various sizes up to 500 H. P.

In the illumination of the Exposition courts and grounds more than 200,000 incandescent electric lights will be used, the wiring for which will require 250 tons of insulated copper wire. It will take about 400 miles of wire properly to carry out the lighting features, as planned by those in charge.

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"PRICES will not be advanced when the consolidation is completed." The consolidation of mining interests is about the only thing of the kind of which the quoted remark can with truth be said.

DETROIT, MICH., furnishes an example of a municipality furnished with cheap power, gas-engine power in that city costing $12 per horse power per year—manufactured gas being sold for 50 cents per M feet for use in gas engines. A good modern gas engine will deliver one full brake horse power with 10 cubic feet of natural gas per hour, which, at 20 cents per 1000 feet, equals one-fifth of a cent per horse power hour for gas.

THE progress made in smelting is aptly illustrated in the case of the I. X. L. mine at Rossland, B. C., which, though it has a 10-stamp mill within 1000 feet of its ore bins, ships its output to a smelter, because the loss in milling foots up more than the freight and treatment charges of the smelter, the latter paying 95% of the gold and silver value of the ore. The fact that the I. X. L. produces what may be styled "free-milling ore" emphasizes the instance.

CONSIDERABLE has been said herein as to the necessity of some recognized standard for electrical measurement. There is a similar existing need regarding a working standard for electrical light. There is not now in existence any workable primary standard that can be used by the ordinary photometer corps, and it is manifestly to the interests of electrical engineers everywhere that some action be taken looking to a correction of this condition.

AS ELSEWHERE, the industrial development of California is almost wholly founded on the mining industry. Had it not been for mining, the Union Iron Works would not have been in condition to make such a battleship as the Oregon and the other vessels that have won for the American flag imperishable renown. Mining brought giant powder into being; it created the Pelton wheel and others of its kind; it brought into being the iron and steel pipe as now made. The cable railway, a San Francisco invention, was inspired by similar use of a wire rope in the Dardanelles drift mine in Placer Co., Cal. Mining has called into existence the largest electrical transmission systems, and is the mother of many other discoveries and inventions of material general value.

A Necessary Measure.

Several mining State Legislatures meet this month and will essay some mining legislation. There are many needful laws which in enactment and observance could be of great value to mining men everywhere. It has been suggested that one salutary requirement would be to the effect that surveys of all underground workings be made and filed with properly designated authority. Mines change owners, properties are abandoned and reopened, and ofttimes it is under present conditions impossible to get any records, the new owners or developers being obliged to depend on whatever meager information may be secured from former superintendents or workmen. Cases will suggest themselves to many readers where thousands of dollars could have been made or saved had there been some accessible record of former exploration or development work. It would be of great value to the several mining States to have substantially such statute enacted, and greatly aid in developing the different districts, it being of common knowledge that whatever occurs in one mine in any district is liable to occur in others therein.

ONE of the industrial developments of this century will be electrical transmission even beyond the present advanced point it has attained on the Pacific coast. While feats of engineering can be exhibited that would not warrant commercial furtherance, it is manifest from actual continued work that electricity in mining and industrial development will have commanding place. Even at Buffalo, where good coal can be had for less than $2 per ton, electricity is in successful competition with other forms of applied energy, though with steam coal at that figure one electrical H. P. must be delivered at a motor in Buffalo at a cost of 1 cent to admit of such successful competition. It is not for the pageantry or pomp of such a show as that typified by the tower illustrated on the first page of this issue that it is deserving of notice herein, but as grandly exemplifying the possibilities of the energy that actuates it on the threshold of the new century. On this coast, where fuel under the most favorable considerations costs twice as much as at Buffalo, the question assumes a more important phase. Fortunately water and gravity aid in the solution of the problem. The streams flowing from the mountains on their way to the sea furnish enough energy to supply electrical light and power to ten times the present population that look out from the western front door of the nation.

THE Mulatos mine, Sonora, Mexico, is reported sold again, this time to men who "will build the largest mill in the republic of Mexico." The voluminous information is vouchsafed that "the ledge is 800 feet wide, and that it would take a 500-stamp mill centuries to reduce it." It is now about ten years since Hayward & Hobart of San Francisco brought suit to recover $1,575,000, which they had paid for the Mulatos mine, alleging that it had been "salted." The Mulatos has been a frequent subject for examination by California mining engineers—Fergusen, McGaskill, Bowie, Janin, Gillette, Harvey and others. Alvinza Hayward tried to work it systematically, on a large scale; but, after an aggregate loss of about $300,000 on the whole transaction, he got out. It is another case of a big mine with a big name. A great mining property that has been a great producer takes on some of the attributes of immortality. Fifty years from now men will tell of the big Cripple Creek dividends, and will get others to take hold of the properties, now profitable producers, in an attempt to resuscitate the glories of the past.

TO THOSE who through the years have noted the effort to secure active work on the restraining barriers in the Yuba river, Cal., the dilatory tactics of some of those who have power must be a source of regret. Still, despite the official drag, the effort does go on. As it stands now, there is $500,000 available; the work is expected to cost $800,000. The California delegation will try to get an additional Congressional appropriation of $150,000, and it is probable a similar amount can be secured by State appropriation this winter, which would make up the necessary amount. This paper never indulges in reproach nor recrimination, and rarely ascribes unworthy motives to action or inaction, but it is moved to remark that two needed public measures dear to the heart of every California miner, the mineral land bill and the impounding barriers, move with a suspicious slowness that lends color to the assertion that some mysterious influence is continuously successful in retarding the progress of those two necessary measures.

ELSEWHERE appears an elaborate discussion of the "miners' inch" from a Canadian standpoint. Some of the suggestions are hypercritical, and savor more of the laboratory or college cloister than of the practical, every-day requirements. Probably the easier or better way to arrange this matter would be to have defined by State statute just what a "miners' inch" is, a legal standard of value. This paper suggests that the statute specify a flow of 1½ cubic feet per second. That would be probably satisfactory, could not be misunderstood, and in that case 40 miners' inches would equal a flow of 1 cubic foot per second, the term in which hydraulic engineers usually make their calculations. What shape or size the box should be, or under what conditions the water should flow, had best be left out of any law on the subject. Local conditions could best determine how the water should be measured. The one thing needful would seem to be a quantitative standard only.

A GOOD illustration of modern mining methods on the threshold of the twentieth century is afforded in Calumet, Mich., where a shaft nearly 1 mile in depth is now being sunk, and, by means of a telephone 5000 feet below the surface of the earth, on the fifty-third level of No. 5 shaft, Calumet branch of the Calumet & Hecla mine, one can stand at the bottom of the shaft and talk to Chicago, Minneapolis, Detroit or Cincinnati, the mine telephones being connected with the long-distance service, as no grounded telephones are used in the mine and telephonic connection can be had with any of the cities of the country that are reached by the overground long-distance service.

IT is a common mistake to assume that economy requires or justifies the payment of inadequate wages or salaries. It is true economy to see that competent men are employed in every department of mining and metallurgical work, and that they be paid accordingly. It has long been quoted that "the laborer is worthy of his hire." He certainly is, in more ways than one: he very soon becomes "worthy" of it, and of no more. For the man who finds that his employer values his services at less than they are really worth, or can be made worth, is likely, if he cannot get such valuation, to agree therewith, and give him only the service in amount and quality for which he is paid.

THOUGH Nature takes no note of time, and its processes are immeasurably slow, yet even in our brief lives can be noted changes in surface formation and conditions. Recent events show how such transformation of appearance slowly takes place. Hudson bay is gradually becoming dry land, as is Tulare lake, the largest lake in California; an earthquake on the Alaskan coast has destroyed the great Muir glacier and completely changed the aspect of that coast, and Steamboat springs, Nevada, have gone dry. At the last mentioned place the process of deposition of metals had long been a noted phenomenon, repeatedly illustrated and described in this and other journals.

ON the principle that a good many things in this world are not had because not asked, a Chicago manufacturing firm that needs more room has asked that city to vacate that portion of the street along which the factory is built, that an extension or enlargement of the enterprising firm's business may be built thereon. The firm argues that they will employ more men and that the enlarged factory will be worth more to the municipality than the now disused street. 'Tis a singular plea, and, if granted, will constitute a troublesome precedent.

IN the issue of this paper of Oct. 3, 1896, T. A. Rickard, late consulting engineer of Stratton's Independence, Ltd., speaks of "the imprudence of mine managers who are forgetful of the necessity of doing an amount of exploratory work which shall keep pace with the removal of ore."

Concentrates.

PURE silicon-copper is made in an electric furnace at Lockport, N. Y.

MONTANA'S copper output for 1900 is estimated to be 300,000,000 pounds.

THE use of a steel or iron tamping bar in loading holes is unlawful in Colorado.

A good hard solder for brass is made thus: Copper, 50 parts; zinc, 46 parts; silver, 4 parts.

IN 191 feet of 3-inch pipe there are 150 square feet of surface: 3×3.1416×12÷144=.785; 191×.785=150.

ABOUT 10,000 pounds of molybdenum were produced in the United States in 1898, worth about $1.25 per pound.

GALVANIZED WIRE ROPES are unfit for use in mine hoisting, as the zinc coating soon wears off and corrosion of the iron causes danger.

THERE is no invention to put off missed shots with safety. Several lives are annually sacrificed and many more endangered in such efforts.

A HOLE bored lengthwise through timber facilitates weather seasoning of green lumber, and northwestern lumbermen who have tried it say that it adds strength to the stick.

THE workings of the Kennedy mine, Amador county, Cal., are probably the deepest of any purely gold mine in the world. It is the ultimate intent to have the shaft 3500 feet deep.

THEORETICALLY, there is no limit to the horse power of a gas engine, it being a question of cylinders. In Belgium gas engines of 1000 H. P. are now in successful operation.

LIQUID CARBON DIOXIDE—liquefied carbonic acid gas—will instantly and effectually smother a fire, and is of use on shipboard or in mines, a cylinder of it often preventing disaster.

ONE pleasant feature of gold dredging is that where good ground is secured, and a proper machine intelligently operated, the money required to run it is furnished by the dredger itself.

WITH a heater of proper size water may be heated to 208° F. in a closed heater by exhaust steam. About one-half square foot of pipe surface should be allowed for each H. P. developed in the engine.

THE highest price of lead in cents per pound in New York City in the past twenty-five years was in March, 1877, 6¾ cents per pound. Its lowest price in that period was in August, 1896, 2.9 cents per pound.

ALL files, when they leave the factory, are covered with oil to prevent rust. When the file is to be used for such work as finishing large cast-iron surfaces of a glassy nature, the oil should be thoroughly removed.

THERE is no correct or complete list or directory of mines or mine superintendents in or for any State or Territory. The user of any such purported "list" will find about one-half of his letters "returned to writer."

A COMPACT LAYER of soot from soft coal one-eighth inch thick in a boiler tube will occasion as much waste of fuel as the same thickness of scale. With soft coal, to have clean tubes they must be daily blown or scraped.

AN injector will raise and force water by means of a jet of steam. It is not so large as a pump of equal capacity, takes up less space, has no moving parts, heats the feed water and, rightly run, costs less than a pump of the same capacity.

PALLADIUM is generally found associated with platinum, from which it is separated by chemical process. It is harder than platinum, fuses at a higher temperature, is worth nearly double, but has a specific gravity about half that of platinum.

THE advantages of using zinc dust instead of zinc shavings in the cyanide process are claimed to be: saving in first cost of construction of plant; ease in handling precipitated gold; intimate contact of precipitating medium with solution; longer time of contact, if necessary.

TO FIND the number of gallons of water that a pump of given size is capable of raising in a given time, multiply the square of the diameter of the water cylinder in inches by four and by the piston speed in feet per minute; divide the result by 120; the quotient will be the number of gallons per minute.

THE value of the record furnished by the diamond drill varies inversely as the value per ton of the material sought, as more dependence can be placed upon the record furnished by the diamond drill when searching for uniformly distributed ores than when searching for high-grade, irregularly distributed ores.

IN determining carbonic acid in limestone, one grain of the finely ground sample is placed in the bottom of the crucible and on top of this is placed a layer of ignited asbestos. The ignition is maintained for half an hour. In determining water alone, there is, after the crucible, only the weighed calcium chloride tube and the guard tube of calcium chloride.

TUNNEL SITES may be located on patented land, if belonging to tunnel site locators,, or if not on land by consent of the owner thereof, either patented or unpatented. But such tunnel can not be driven through any lode claim previously located without the consent of the owner thereof. All agreements of such kind must be in writing, properly acknowledged and recorded in the county records of the county wherein the tunnel site is located.

A "BARREL" is an indefinite term. The "barrel" of the schools is 31½ gallons. The "barrel" of statistics is 42 standard gallons of 231 cubic inches each. A barrel of petroleum varies from 40 to 50 gallons. The Canadian barrel is 35 imperial gallons of 277.27 cubic inches each, hence contains 9704.4 cubic inches. The American standard barrel is 9702 cubic inches.

A TON of coal as carbonized in a gas works yields from 10,000 to 11,000 cubic feet of gas, which hold in diffusion 20 pounds to 24 pounds of hydrocarbon vapors, including 16 pounds to 18 pounds of benzol, about 120 pounds of liquid tar, of which 25 pounds to 30 pounds are carbon held in suspension, 2 pounds or 3 pounds are hydrocarbon similar to the vapors above mentioned, and 12 pounds to 14 pounds are naphthalene.

CHEMISTRY, like electricity, now enters largely into nearly all manufacturing processes, and the saving of by-products is usually a question of chemical engineering only. It is one thing to perform a chemical experiment in a laboratory, in a small way, where the economy of the operation does not enter at all, and an altogether different thing to devise ways and means by which the same thing can be done continuously, on a large scale, in a factory, and at such a cost as to make the operation profitable. The man who can do both of these things is the chemical engineer.

DIFFERENT mine managers and superintendents have different ways of figuring costs, and may show a large production of ore at very small cost, though the figures for exploratory work and construction may be very large. Another may show very small cost of milling, indicating ability to make extremely low grade ore pay. As for the cost of mining and milling per ton, that can be ordinarily determined by dividing the total tonnage mined and milled into the total costs; the yield per ton is the tonnage milled divided into the gross bullion product; the profit per ton is the difference between the cost and yield per ton.

WIRE NAILS will stand the weather test better than steel cut nails. The surface of wire nails is entirely smooth; that of the cut nail is rough on two sides, giving greater opportunity for collection and saturation of moisture. As between steel and iron there would be an advantage in using steel nails, as they are less liable to rust. The process of galvanizing nails after cut has been perfected, the use of the galvanized nail being advocated. It is desirable to use a small nail with extra large head, and nails galvanized after they are cut, not nails cut from galvanized wire, as on the latter the head and point are exposed and the coating is not as perfect as in the case of nails galvanized after cut.

To determine the gold in copper bullion a usual scorification method is as follows: Weigh out ten samples of 0.1 assay ton each, scorify with fifty grains of test lead, and pour. Remove the slag adhering to the lead buttons and repeat the scorification twice, finally uniting five buttons into one, thus obtaining two lead buttons weighing about twelve grains each, and corresponding to 0.5 A. T. of the original bullion. These are to be cupeled as usual, and should check each other within the allowed approximate limits. This method involves some labor and expense, but is deemed to give results to 0.08 ounce gold higher than the ordinary method on bullion running from $40 to $60 per ton.

ELECTRIC detonators or exploders for blasting are made and sold. With a little effort one can make one for himself. Take two pieces coarse copper wire, about No. 14 or 16; join the ends with a piece of fine platinum wire, No. 26 or 28. The platinum and copper wires should be joined by twisting rather than by soldering. About ¼-inch of free platinum wire is needed between the copper wires. The other ends of the copper wires are to be joined to the battery. The platinum wire is to be buried in the black powder to be ignited. When the circuit is closed, the electric current heats the platinum wire to redness, and this fires the powder. A two-cell dry battery is ordinarily sufficient. Size for size the resistance of platinum is about 5½ times that of copper.

WHERE the locator of a claim allows his title to lapse by reason of non-performance of assessment work and the claim is taken up by another, all improvements made thereon and upon the claim at the time the second locator has perfected his location becomes the property of the second locator—any State laws to the contrary notwithstanding. The original locator has the right to remove any and all improvements while the claim is still in his possession—loses this right when his successor has taken up the forfeited location and perfected his location of the claim. Fixtures, including such improvements as engines, boilers, hoists, mill, or any other things of this character annexed to the soil for mining, become part of the freehold, and as such pass to the relocator.

AS the heat conducting power of copper is about twice that of iron or steel, one would naturally suppose that a much smaller boiler would do for the same power if made of copper than if made of iron or steel; but such is not the case. Nor does it make any material difference after a boiler has been in use a few times whether it have tubes an inch thick or 1-100 of an inch thick in so far as evaporation is concerned. The reason for this lies in the fact that the main resistances to the passage of the heat from the fire to the water are not the resistances offered by the metal itself, but are due to a film of air or burnt gas which clings to the metal on the furnace side, or, more probably, to the soot or metal oxide on the furnace side, and also to a similar (but less) resistance which the heat encounters in forming on the water side. Consequently, when all three resistances are added together the resistance of even the thickest plates of steel in use for boilers is so small that it amounts generally to less than 1% of the resistance offered by the air and vapor films.

ZINC SLABS suspended in steam boilers prevent the formation of scale. The proportions are 1 square foot of zinc to 50 square feet of heating surface in new boilers, which may be diminished after a time to 1 in 75. The best method of fixing the zinc is to place a number of studs in the sides of the furnaces and combustion chambers and to bolt on to these studs the zinc plates, which should be about 10x6x1 inch. It is important to see that the contact surfaces are clean and bright and the nut screwed close to the zinc to exclude the water from the contact surfaces, and thus comparatively insulating them and preventing galvanic action. Otherwise the zinc is acted upon mostly as a solvent that renders the water inocuous or non-exciting.

THE mass—that is, the weight—of a line of given length and resistance is proportional to the product of the resistivity (that is, the specific resistance,) and the density of the material, both of which are physical constants. This product for iron is 78, for copper 14.24, and for pure aluminum 7.54. The weight of metals for lines made of these materials will therefore be the proportion of these figures. If, for instance, the cost per pound of aluminum is about double that of copper, then the cost of the line would be about equal for these two materials, as 14.24 is about double 7.54. When the cost of aluminum is less than that, it would be the cheaper of the two metals. Copper is quoted this week in New York City at 17 cents per pound, and aluminum at 35 cents per pound. It is to be borne in mind that the line, if of aluminum, would have to be larger than if of copper.

TO REDUCE silver sulphate to metallic silver, it may first be leached from other substances present by means of hot water. The silver sulphate solution is then run through a series of vats containing vertical plates of copper, when in the chemical reaction each ounce of silver will be replaced by 0.16 ounce of copper, resulting in the consumption of copper and the precipitation of the silver in the form of fine mud, subsequently collected at the bottom of the vats, washed and refined. It can be refined in any one of three ways—by melting in graphite crucibles with a small amount of niter and carbonate of soda; by melting with lead and cupelling; or, by being cast into convenient-sized anodes and treated electrolytically. The copper consumed in the precipitation spoken of above may be recovered by passing the copper sulphate solution over scrap iron, forming cement copper and ferrous sulphate.

THE question of the strength of materials for boilers was elaborately tested some years ago by the Franklin Institute. It was then found that the tenacity of boiler plate increased with the temperature up to 550° F., at about which point the tenacity began to diminish as the temperature rose. At 32° F. the cohesive force of a square inch section was 56,000 pounds; at 570° it was 66,500 pounds; at 720° it was 55,000 pounds; at 1050°, 32,000 pounds; at 1240°, 22,000, and at 1317°, 9000 pounds. Copper follows a different law and appears to be diminished in strength for any increase in temperature. At 32° F. the cohesion of copper was found to be 32,800 pounds per square inch section, and exceeds this cohesive force at any higher temperature, the indications being that the square of the diminishing strength keeps pace with the cube of the increased temperature. Strips of iron cut in the direction of fiber were found to be 6% stronger than when cut across the grain. Welding was found to increase the tenacity of the iron, but welding together different kinds of iron was not found to be favorable. Overheating was found to reduce the ultimate strength of plates from 65,000 to 45,000 pounds per given section, and riveting of plates was found to diminish the strength one-third.

IF a gas engine has been tested with gas of low quality, and is put into hard service with a fuel of higher calorific value, the greater heat given to the piston will cause it to bear too tightly at some points upon the cylinder walls. This is because the mass of iron in the piston is not homogeneous, and the denser portions will be subject to greater expansion. After running for a short time under full load, when these conditions exist, a sharp knock will be heard in the cylinder at every revolution, and, if the piston is removed, it will be found that some parts of the surface are worn bright while the rest shows no wear. The only remedy is to file down the bright spots until where fully loaded the wear will be uniform. The maker of the gas engine will see when the machine leaves his place that the piston runs smoothly with the gas used in testing, but greater heat will occasionally cause one to run with too much friction, and require some additional fitting. If, by any chance, the engine is found to be very hot, cold water should never, under any circumstances, be turned suddenly into the water-jacket and the engine kept running. The almost certain result of such an act will be the instant contraction of the cylinder walls upon the expanded piston, with an enormous increase in friction, possibly enough to lock the piston and wreck the engine. In such a case the safe plan will be to stop the engine first and cool it afterward, but, when this is not practicable, turn on the cold water very slowly, so that the piston may cool to some extent along with the cylinder.

Power Transmission.

By ALTON D. ADAMS.

The disadvantages of steam driven electrical machinery for long-distance transmission power arise from the fact that but a small fraction—hardly more than 7% or 8%—of the energy of coal can be delivered at the receiving station, while the investment must include equipment having capacities several times greater than the rate of power delivery. On the varying loads of a large power transmission system it is probably fair to assume a consumption of 2 pounds of coal per horse power hour developed in engine cylinders. The following efficiencies may also be fairly assumed for the several elements of the generating and transmission system: Steam engine, 90%; dynamos, 90%; step-up transformers, 95%; line conductors, 80%; step-down transformers, 95%; rotary converters, 90%. The combined efficiency of all these parts is obviously the product of their individual efficiencies, or .90×.90×.95×.80×.95×.90=.52, or 52%, referred to the power developed in the engine cylinders. As each horse power hour developed in the engine cylinders requires 2 pounds of coal, and the machinery and line waste about one-half of the energy imparted to them, about 4 pounds of coal must be consumed for each horse power hour delivered at the point of use. A coal, moderately good, will yield, on burning, 12,000 British thermal units per pound, so that 4 pounds develop 48,000 heat units.

Since one horse power hour is the equivalent of 2545 heat units, the steam and electric transmission system, on the above basis, delivers from the receiving station about 2545÷48,000=.053, or 5.3% of the energy derived from the coal burned at the generating plant. Counting the delivery capacity of the steam engines at the generating stations as 1, the capacity of the electric generators is .9; step-up transformers, .9×.95=.855; step-down transformers, .9×.95×.80×.95=.65; and that of the rotary converters, .65×.90=.58 of the engine outputs. The total combined capacity of engines and electrical apparatus necessary is, therefore, about 1.+.9+.85+.65÷.58=3.98 times the engine capacity. For each electrical horse power delivered by the rotary converters there must, then, be installed a capacity of 3.98÷.38, or nearly 7 H. P. at the generating and receiving stations.

The development of gas engines is of marked interest in connection with the problem of long-distance power transmission, because the energy developed as mechanical motion in their cylinders bears larger ratio to the total energy from coal consumed than is the case in steam engine cylinders. It was assumed for the above case that the development of one horse power hour in the steam engine cylinder requires the consumption of 2 pounds of coal containing about 24,000 heat units, and though slightly better results can be obtained under the most favorable conditions, they are hardly expected to be in a plant for power transmission. In contrast to the above results with steam engines, gas engines are now at work that deliver a horse power hour on a consumption of gas containing less than 12,000 heat units.

The weight of coal necessary to generate a quantity of gas that will develop 12,000 heat units when burned varies with the process of gas production. Coal gas is made by distilling bituminous coal, and 1 ton of coal yields on the average about 10,000 cubic feet of gas, 1400 pounds of coke, 10 pounds of tar and 20 pounds of ammonia sulphate. About 350 pounds of coke are required to reduce 1 ton of coal to the above products, and this leaves the net amount of coke at about 1150 pounds per ton of coal treated. Coal gas yields, approximately, 650 heat units per cubic foot when burned, so that the gas from 1 ton of coal represents 650×10,000=6,500,000 units, more or less, that is, slightly more than one-fourth of the total heat per ton of coal, allowing 12,000×2000=24,000,000 heat units to the ton. On the basis of 10,000 cubic feet of gas per ton of coal, each pound of coal produces 10,000÷2000=5 cubic feet of gas. From 16 to 17 cubic feet of this gas are required per horse power hour in engines of fairly large capacity, and this amount of gas obviously requires from 3 to 3½ pounds of coal for its production. The value of coke and other products above named, aside from the gas, is usually greater than that of the coal from which they are obtained, so that the cost of the gas consumed per horse power hour in gas engines is much less than that of the total coal consumed—to a company that produces the gas. The production of coke by a process in which all the gas, tar and ammonia are wasted, and only about 1400 pounds of coke obtained per ton of coal, is a large and paying industry. Coke from gas ovens or retorts is usually 10% to 20% less in value than coke from the purely coke ovens, but it appears that the tar and ammonia have enough value to make up this difference, so that gas and coke ovens can be operated close to the mines at a profit, even if the gas is wasted.

Coal gas, representing only about one-fourth of the heating energy of coal from which it is produced, is not, however, the only kind of gas to be considered for power transmission. Anthracite coal and coke, when properly treated, yield fuel and produce gas that contains as much as 80% of the units in the coal, and rice coal, or that of the least value, because of its fine size, is really used in this process.

One ton of anthracite coal, rice size, will generate fuel gas having fully 20,000,000 heat units, or about 140,000 cubic feet, each foot containing not less than 140 heat units. Each pound of coal, therefore, produces as much as 70 cubic feet of this fuel gas, and, as not more than 85 cubic feet of the gas are required per indicated horse power hour, the coal consumed per horse power hour is from 1 to 1¼ pounds, or but little more than one-half the necessary amount for steam engines. In the plant with gas engine a choice can be had between regular coal gas and producer of fuel gas. If coal gas is used, about 3.5 pounds of coal must be handled per horse power hour at the engines, but the coke and other products are worth more than the entire amount of coal used. When fuel gas is used in the engines, less than 1.25 pounds of coal are used per horse power hour, but there are no valuable side products. The gas engine thus greatly increases the chance of financial success of electrical transmission of energy from cheap fuel to great distances by cutting the fuel item in two.

The necessary low efficiency, the great combined capacity of its elements, and the large capital outlay for the electrical equipment still leave its ability to compete with railway transportation of coal in doubt. The gas engine develops one horse power hour, the equivalent of 2545 heat units, on a consumption of coal containing about five times this amount of heat energy, and the machinery and line for electrical transmission deliver about one-half of this fifth, or a little more than one-tenth of the energy of the fuel consumed, to the distribution lines at the receiving station. A delivery of one-tenth of the energy of fuel at the point of use, after a long transmission, may have a limited application for power purposes alone, but can never be of material importance for heating purposes. It may now well be asked whether the power driven dynamo, with its connecting transformers, line and converters, is the best available means for the transfer of energy over long distances. Can the gas engine, the dynamo, the step-up and step-down transformers, the line and the rotary converter, or any of them, be replaced in long-distance power transmission by other devices that will give either a high efficiency in the transfer of energy from coal pit to consumer, or a lower first cost for the complete equipment? As has been seen, coal gas contains fully one-fourth and fuel gas eight-tenths of the heat units found in the coal from which it is produced, and it may be possible to transfer either, or at least one, of these gases directly to the points where power and heat are wanted, there to be expected to drive gas engines, either with or without dynamos, for power, or burned directly, for heat. Starting with a plant for gas production at the coal mines, the system of electrical transmission includes gas engines, dynamos, two sets of transformers, line conductors, and, usually, rotary converters in its equipment, whether the energy is to be used for either mechanical power, heating, or both.

To compare readily the relative amount of equipment necessary for the electrical and the pipe line system of transmission and the ratio between gas consumed and energy delivered by each, it is convenient to assume a case of definite power delivery over a fixed distance. The following estimates are, therefore, based on a delivery of 10,000 H. P., or of sufficient gas to supply that work, at a point 150 miles from the place of production. Taking up at first the case of electric transmission of power generated by gas engines, the high efficiency of 80% may be assumed for the line conductors, 95% for transformers, 90% for dynamos, and 90% for rotary converters. The delivery of direct current for general purposes at the place of use on these assumptions is, therefore, .85×.95×.95×.90×.90=.62 of the mechanical energy supplied by the gas engines to drive the dynamos.

The quantity of gas consumed by the engine is, therefore, found to be the equivalent of 10,000÷.62=16,129, or 16.129 H. P.; for a delivery of 10,000 H. P. at the rotary converters, 10,000; step-down transformers, 10,000÷.9=11,111; step-up transformers, 11,111÷(.9×.885)=13,764; dynamos, 13,764÷.95=14,490; and gas engines, 14,490÷.9=16,100 H. P. The total combined capacity of machine equipment is, therefore, 10,000+11,111+13,764+16,109+14,490=65,465 H. P. To transmit the electric energy from the step-up transformers at the generating plant to the step-down transformers at the receiving station copper conductors must be erected, and their weight, for a given per cent or less, will vary inversely as the square of the electric pressure at which the transmission takes place. It is, therefore, desirable, for economy of conductors, that the volts at which the transmission takes place be as high as practical. At the present time one electrical transmission is being carried on at 40,000 volts over a line surrounded by the dry air of a high altitude, in California, but it remains to be proved that so high a pressure is practical on a line that must encounter the moist air and rainy weather common over a great part of the country. To make as favorable a showing as is practical for the electric system, the transmission for the present case is assumed to be carried out at a pressure of 30,000 volts, though it is by no means certain that so high a pressure would be practical on a line 150 miles long in the climate of the central and eastern part of the United States. It was found above that the step-up transformers at the generating station had a capacity of—that is, would deliver to the line—13,764 H. P., which corresponds to 10,266,265 watts, so that at 30,000 volts the current will be equivalent to 342 amperes. On the three-phase system the weight of copper necessary to transmit the 10,266,265 watts a distance of 150 miles at 30,000 volts and an efficiency of 85% is 2394 tons of 2000 pounds each. A fair weight for the complete machine equipment of 85% is 2394 tons of 2000 pounds each. A fair weight for the complete equipment of gas engines, dynamos, transformers, rotaries and fittings may be taken at 100 pounds per horse power capacity, so that the total weight of machinery will be (65,465×100)÷2000=3273 tons.

To sum up the case for the electric transmission, each horse power hour delivered at the place of use requires the consumption of gas sufficient to produce 16,100÷10,000=1.6 horse power hours at the engine; each capacity of delivery makes necessary the installation of 65,465÷10,000=6.5 horse power capacity of machinery, weighing about 6.5×100=650 pounds, and 4,788,000÷10,000=478 pounds of copper conductor. Allowing a consumption of 18 cubic feet of gas, containing 650 heat units per cubic foot, or a proportionately larger consumption of gas having less heating power, per brake horse power hour delivered at the gas engine, the heat units in gas consumed for each horse power hour of 2545 heat units, supplied to consumers at the point of the distribution, is 650×18×1.6=18,720. The electric transmission can, therefore, deliver to the consumer for heating purposes but 2545÷18,820=.13 of the heat contained in the gas consumed. So long as gas is consumed quite near the point of its production the heat units obtained per cubic foot of gas is a matter of secondary importance, but when it is desired to transmit gas to a great distance the efficiency of the transmission will depend, in large measure, on the heating of the gas consumed.

The fuel gas contains only about 140 heat units per cubic foot, and nearly 90 cubic feet are used in the gas engine per brake horse power hour delivered by it. This would require the consumption of 1.6 times the amount of gas necessary to develop the 10,000 H. P. at the end of the 150-mile transmission, with a line of 40-inch pipe, weighing 52,000 tons. So low an efficiency, coupled with so heavy a pipe line, seems to make the fuel gas impractical for long transmission through pipes. The coal gas, or that containing about 650 heat units per cubic foot, will yield a horse power at the engine shaft of less than 18 cubic feet of gas per hour, and to develop 10,000 electrical horse power at the terminals of dynamos driven by gas engines, the engines must be supplied with 10,000×18÷.9=200,000 cubic feet of gas per hour, the efficiency of the dynamos being 90%. To transmit this 200,000 cubic feet of gas per hour through a steel pipe of 20 inches diameter there must be expended somewhat less than 1000 H. P. at the gas generating plant for pumping. The total gas consumed in terms of that necessary to produce 10,000 H. P. at the engines is, therefore, 10,000÷.9+1000÷10,000=1.21 times as much.

The weight of a steel pipe 20 inches in diameter and 150 miles long, of plate ¼ inch thick, is about 41,600,000 pounds, or 20,800 tons.

The gas engine capacity required for pumping gas and driving dynamos is 10,000÷.9+1000÷12,100 H. P. Dynamo capacity is 10,000 H. P., making the total machine capacity 12,100+10,000=22,100 H. P. Allowing 100 pounds to the horse power, the total weight of machinery is 22,100×100=2,210,000 pounds, or 1105 tons. The weight of machinery per delivered horse power is 2,210,000÷10,000=221 pounds, against a weight of 650 pounds in the electrical transmission system. Deducting the weight of machinery for the gas transmission from the weight for the electric shows an excess for the electric system of 650—221=429 pounds per horse power delivered to consumers, and this difference in machinery weights is mostly made up of electrical equipment. The electrical system also requires 478 pounds of copper conductor, which is approximately of the same value per pound as electrical machinery, so that the excess of the electrical equipment over the machinery for the gas pipe line may be fairly taken as equivalent to 429+478=907 pounds of copper per delivered horse power. The gas transmission requires, however, 41,600,000÷10,000=4160 pounds of steel pipe per delivered horse power, and this is the equivalent of about 4160÷6=693 pounds of copper at market prices. The cost of the excess of equipment for the electric system over that of the gas pipe line complete may, therefore, be measured by the value of 907—693=214 pounds of copper per delivered horse power. As the electrical transmission delivers as electric current to the consumer 1 H. P. for each 1.6 H. P. developed at the engine, its efficiency is 1÷1.6=62%, while the efficiency of the gas transmission system referred to the engine production is 1÷1.21=82%.

These figures for efficiency refer to the final delivery of energy for each system in the form of direct current. If the transmitted energy is to be used for heating, the electric system will deliver to the consumer about 13%, and the pipe line system, by applying gas, about 90%, of the heat units from the total gas consumed.

Treating Non-Smelting Ores in South America.

The Huarhaca Company of Bolivia, and at Huantajaya, Cerro Gordo and Santa Rosa, in the province of Tarapaca, Chile, buy the ores outright at prices lower per ounce for the silver in low-grade ore than in rich ore. Ore containing more than thirty-five ounces per ton is usually treated by amalgamation; ore from thirty-five ounces down to eighteen ounces per ton, by the ordinary process of extraction by hyposulphide of soda without using sulphate of copper.

The process of amalgamation in use is a fusion of the old Peruvian system with the old Washoe system. The ore is ground to the fineness of a mesh of from twenty to forty to the inch, and then removed to an amalgamation barrel revolving on an eccentric axis, a jigging as well as circular motion being imparted to it. Here the ore is mixed with water, salt, copper sulphate, iron sulphate, mercury and zinc amalgam. When the amalgamation is complete the mass is allowed to settle, the mud run off by a pipe placed about a foot from the bottom and the amalgam run off at the bottom and retorted, the silver being afterwards melted into bars. An extraction of about 95% is usually obtained.

In the usual method of lixiviation of silver ores in Chile no copper sulphate is used, the hyposulphide of soda alone being found sufficient to dissolve the silver chloride in the ore. The ore is brought to the mill from the adjacent mines in sacks on mule backs, and, after weighing, is dumped into the sampler, consisting of a hopper having at the bottom two exits, one 9 inches square and the other 2 inches square. Through the large exit the ore passes down a chute to the yard, while some of the ore passes through the small exit down a 2-inch pipe from which a branch pipe leads back to the ore chute, so that the small quantity of ore passing down the 2-inch pipe is divided into two parts, one part going back to the chute and the other part to the sample bag. In this way the whole shipment is sampled; the sample thus obtained is taken to the sampling room and an average portion crushed fine on a circular iron plate by an iron hand pestle weighing about 300 pounds. To work the pestle requires strength and skill, a side circular motion being used, causing it to gradually travel round the plate and to the center. With a skilled hand a sample can be crushed and ground fine enough to assay in five minutes. The site of the mill is usually on terraces on the side of a hill, in order to save handling. The ore is shovelled from the yard through hoppers into ball-mills, of which there are usually two. Here the ore is ground to a fineness varying with the nature of the gangue; in Tarapaca, where the gangue consists of calcite and clay, coarse grinding is the rule. On passing out of the ball-mill the ground ore is removed by means of a screw to an endless chain of buckets and emptied into a revolving calciner. The weight of ore each bucket will carry is known, and an amount of salt, calculated at about 4% of the weight of the ore, is added by a workman stationed there. None of the mills have any automatic arrangement for feeding the salt, partly owing to the cheapness of labor. The ore is heated to a reddish yellow heat, sufficient for good chlorination, without volatilizing the silver. Contrary to expectation, the silver chloride ores, if treated alone, are not so well adapted to the process as the sulphide ores, as salt does not readily evolve chlorine at a low heat unless acid fumes exist in the furnace to decompose it. When silver chloride ores are treated alone, the change to the soluble form only takes place at a temperature sufficient to volatilize the silver chloride; it is customary to mix the chlorides with the sulphides for the sulphurous acid evolved from the sulphides, both the silver sulphide and the insoluble silver chloride being converted into the chloride soluble in hyposulphite of soda.

After chlorination, the ore is removed in trucks to the cooling floor. When cold, the ore is removed to the lixiviation vats, where the ore is first washed with cold water to remove the salt and all soluble lime and copper salts, the presence of lime being injurious, as it precipitates the silver among the ore after its solution in the hyposulphite. The ore coming from the furnace is usually analyzed for the amount of caustic lime it contains, and, calculating the weight of ore in each vat, a washing of weak sulphuric acid is given to it in sufficient quantity to neutralize the lime. After being given one acid wash and three washes with water, the solution is run on in three washings, lasting about twelve hours each, generally from below, as it is found to penetrate the ore better from below than from above. The strength of the solution is about 1%.

The precipitation is carried out by means of sodium sulphide, manufactured at the mill by blowing steam into a solution of caustic soda mixed with sulphur powder. Generally the sodium sulphide is added in such quantities as to leave some silver still in solution, because the precipitate subsides quicker under those conditions and allows the same solution to be used over and over again, precipitating insoluble silver sulphide among the ore if it contained an excess of sodium sulphide. Owing to the presence of salt, the chloride of silver is found to partially dissolve out of the ore with the first washing with water, and the silver is precipitated from this salt solution separately. The same solution of hyposulphide can only be used about six times, depending on the richness of the ore, for, although the soluble salts are removed from the ore by the preliminary acid and water washings, in time it becomes saturated with sodium chloride and weakened in power from the addition of sodium sulphide in the precipitation of the silver from its soluble chloride form as the insoluble sulphide.

In using ball-mills care has to be taken to use iron balls in good condition, otherwise they become chipped in grinding the ore, resulting in the intermingling of pieces of metallic iron with the ore and consequent precipitation of metallic silver among the ore itself in the lixiviation vat. The precipitation vats are of wood, 10 feet high, 4 feet wide at the top, 5 feet wide at the bottom, and provided with two laps, one for running off the solution and the other for running off the precipitate. The precipitate of black silver sulphide is run through a sludge pipe to filter presses, where it is pressed into cakes and finally dried in a hot room. When dry it is placed in sacks and shipped to England. All the mills have a chemical laboratory and assay office, where every parcel of ore purchased is sampled and assayed, and check assays and tests are made from each department of the works. A sample of the chlorinated ore is taken every day fresh from the furnace, an assay made to show whether any volatilization of silver has occurred, and part of the sample is washed with acid, water and fresh hyposulphite solution. If the silver chloride is readily extracted, it is concluded that the chlorination of the ore in the furnace was satisfactory. An assay of the tailings is taken at the conclusion of each treatment. If more than two ounces of silver per ton are found to remain, two samples are taken, one washed with pure hyposulphite and one with the solution in use in the works. If more silver is extracted by both solutions, the ore is given another washing; if only the pure hyposulphite extracts silver, the works solution is charged; if no silver is extracted, as sometimes happens, it has generally been through carelessness in the works in the preliminary acid and water washings. The chloridized ore is daily tested for free lime and daily tests are made of the strength of the hyposulphite solution by titration with iodine. The strength of the solution is never allowed to sink below one-half per cent.

Coarse Concentrating Without Sizing.

S. W. Traylor, traveling representative of the Colorado Iron Works, Denver, Colo., who gives special attention to the operating of concentrating machinery, furnishes the MINING AND SCIENTIFIC PRESS with the following report on a test run of Georgia ore over a Bartlett concentrating table. It will be noted that the test was one of coarse concentrating without sizing:

As illustrative of what can be done in the way of effective concentration of coarsely crushed ore on tables without sizing, the following cases are briefly presented, giving some interesting results we have recently obtained with ores offering, it must be said, conditions quite unfavorable to good concentration under any system. By coarse concentration is meant as coarse as will secure a satisfactory freeing of ore minerals from gangue and included all sizes suitable for jigging, up to at least 7 millimeters or ¼ inch. The test was on Georgia ore carrying gold, silver, copper, lead and zinc, consisting of iron pyrites, copper pyrites, galena and zinc blende in small quantities quite finely disseminated in a hard, tough quartzite. The zinc occurs, it will be observed, in much larger quantity than any of the other metals and the object sought in the concentration was to secure the largest possible saving of the valuable metals, copper, lead, gold and silver, with the least amount of zinc in the concentrates, so that the latter would escape "docking" for zinc at the smelter.

The ore was crushed to 8 mesh with jaw crusher and two sets of rolls and then treated on a Bartlett table without any sizing, with the following results:

	Ore	Concentrates	Middlings	Tails	Per cent saved in concentration. Con.—21.8% of ore
Copper	2.65%	9.30%	2.00%	0.90%	76.5%
Lead	2.90%	12.50%	0.30%	0.20%	94.0%
Zinc	5.20%	9.10%	5.00%	4.00%	38.1%
Gold	0.18 oz.	0.72 oz.	0.06 oz.	0.03 oz.	92.8%
Silver	1.22 oz.	4.08 oz.	0.56 oz.	0.41 oz.	72.9%
Weight	4850 lbs.	1059 lbs.	468 lbs.	3323 lbs.	
Per cent	100	21.8	9.6	68.6	

By recrushing the 468 pounds of middlings and retreating on the table, additional concentrates would, of course, be obtained and the above percentage of metals saved would be correspondingly increased.

Colorado Mine Report for 1900.

H. A. Lee, Colorado's Commissioner of Mines, in his biennial report, notes the prevalence of fatal accidents, and cites as reasons therefor, "incompetent management, incompetent miners, lack of discipline, carelessness." Like other States, the laws of Colorado allow any one to manage a mine and do not place any requirements of ability or experience on either miners or mine managers in any degree sufficient to make life safe. The Colorado official urges the more detailed enactment of measures to enforce good timbering; removing of old timbering; to limit the amount of powder and oil stored at any given point more thoroughly than it is limited at present.

According to Commissioner Lee's report, in 1899 and 1900 there have been 1217 accidents in the metalliferous mines of Colorado, which he figures out to be a percentage of 15.32 injured out of every 1000 miners at work, or 1½% of all miners engaged at labor in the State. The fatal accidents during the past two years have been 210, which is 6.24 fatal accidents in every 1000 miners at work. The accidents classed as "non-fatal" foot up 1007. Lack of good timbering is asserted to be a "fruitful" source of accident.

The cost of the department to the State has been $24,000 for the biennial period, about half as much as the cost of the California State Mining Bureau for the same time. The number of men employed in mining in Colorado is given as 40,111 and in the detailed list of counties the number of counties employing more than 1000 men is thus shown: Arapahoe, 2093; Boulder, 1597; Clear Creek, 2012; Gilpin, 3124; Lake, 7470; Ouray, 1897; Pueblo, 2084; Pitkin, 1560; San Juan, 1405; San Miguel, 1723; Teller, 7920. These and all other counties make a total of 40,111.

Parts of two tables submitted with the report are as follows:

TOTAL METAL PRODUCTION IN COLORADO.

	Gold.	Silver.	Lead.	Copper.
	$223,126,729	$340,254,263	$93,302,223	$12,611,336
1870	3,015,000	660,000	.....	20,000
1880	3,200,000	15,055,302	3,595,939	184,000
1885	4,200,000	13,014,927	4,345,000	127,435
1890	4,150,000	19,665,245	4,883,200	945,000
1895	13,559,954	11,683,232	2,954,714	659,050
1899	26,508,675	13,771,731	6,170,765	1,869,169

PRECIOUS METAL PRODUCTION FOR 1899.

County—	Gold.	Silver.
Boulder	$ 547,858	$ 45,501
Clear Creek	546,824	895,427
Gilpin	1,996,060	202,960
Lake	2,196,497	4,307,704
Ouray	1,694,940	1,397,862
San Juan	996,273	710,108
San Miguel	1,376,704	719,961
Teller	16,058,564	49,033

These and all other counties of the State making these 1899 totals: Gold, $26,508,675; silver, $13,771,731; lead, $6,170,765; copper, $1,869,169; total for 1899, $48,320,341.

Magnetic Separators.

TO THE EDITOR:—Regarding the inquiry from Wallace, Idaho, relative to magnetic separation, an ordinary fixed magnet placed between crusher and bin is entirely inadequate to take out the steel or iron which may pass with the ore, for the reason that there is no means of detaching the attached pieces except by hand. With a rotary drum the material is discharged automatically. The magnetic field in the fixed magnet is so extremely small, weak and uncertain that it is not at all reliable. There must be a live current passing through a fixed magnet the same as through the revolving drum, and there is not very much difference in the expense if the magnet is made large enough to handle the ordinary output of a mill. The magnet for this purpose is better made of very soft wrought iron or soft annealed steel wrapped with six or ten coils of insulated wire. I do not think that Mr. Edison has any device for this purpose, except a fixed magnet for separating iron ore, which is only successful when six or eight of these magnets are placed one over the other. The expense of this apparatus would be very much in excess of the rotary drum.

New York City. C. G. BUCHANAN.

Patent for Co-owners.

Where several persons own equal interests in a group of locations and seek to obtain U. S. patents, can such patent be obtained in the joint names of all? Or must property be conveyed to one individual and patent issue in his name? If patent will issue in the names of several, is it not best to have all join in granting power of attorney to one person to do all that is requisite?

Austin, Nev., Dec. 26.

Assuming that the above questions apply to a case where the claim to be patented is not owned by a corporation, it is the custom in such instances as the one cited to select one of the co-owners to act for all, and a special power of attorney is usually filed with the application; but this is not necessary. The department ordinarily recognizes such an application, signed by one joint owner in behalf of himself and the other owners. The patent issues in the name of the applicant.

"The Miner's Inch," in Canada.

So much has been said in these columns about the "miner's inch," that it would appear unnecessary to make further reference to a subject that, so far as the west half of the United States is concerned, is one of general understanding, a part of that understanding being knowledge of the fact that the term is indeterminate, and means different quantities in different States.

Regarding the "miner's inch," in British Columbia, in a paper entitled "The Miner's Inch and the Discharge of Water Through Various Orifices Under Low Heads," Thos. Drummond writes as follows:

The miner's inch of water, it may be explained, is an arbitrary module adopted in mining districts for selling water. It is variously defined as being the amount of water discharged by an orifice 1 inch square, or an equivalent fraction of a larger orifice with a head of from 6 to 9 inches. The thickness of the orifice is usually 2 inches.

One great difficulty is that it is a variable quantity depending upon the specified head, and therefore all such modules should also define the flow in cubic feet per minute.

In British Columbia it is defined as being 1.68 cubic feet of water per minute, or that quantity of water which will pass through an orifice ½ inch wide, 2 inches high and 2 inches thick, with a constant head of 7 inches above the top of the orifice, and every additional inch shall mean so much as will pass through the said orifice extended horizontally ½ inch. As a definition, unfortunately, this is completely wrong. In the first place, widening the orifice as above changes the coefficient of discharge, and therefore the discharge itself. In the second place, this orifice actually discharges 2.147 cubic feet of water per minute, instead of 1.68 cubic feet, and this brings out a curious point referred to above, that certain shaped orifices, with a thickness of 2 inches, run full like a short tube, the vein is not contracted, and they actually give a greater discharge than they are supposed to give. The orifice in question runs full in the horizontal and vertical positions with heads of from to 12 inches.

A 1x2-inch orifice 2 inches thick is just on the margin between flow with contraction and full bore. If fixed in the vertical position, with longest diameter vertical, the vein contracts. If fixed in the horizontal position, with the longest diameter horizontal, it will also contract, but if rubbed with the fingers on the edge it will run full for a time and then contract again. If kept running full in this way it will discharge about 1 cubic foot of water per minute more than when full contraction takes place.

There are practical difficulties in the way of delivering absolutely exact quantities of water; and they cannot be measured out as a pound of tea is weighed over the counter. The definition of the module or unit, however, should be correct within a reasonable limit of error. If it is a definition of a single miner's inch from an orifice of 1 square inch, it should go no farther. If the inch is defined as being some practical part of the discharge from a larger orifice, it should go no further than the capacity of that orifice, and as it is an unknown quantity to the outside world the discharge should be given in cubic feet per minute. Convenient discharges are 1½ and 2 cubic feet. The flow under low heads is irregular. Heads of 1 foot or more are not convenient because the water is delivered from ditches or flumes where the depth of water is never great. The question thus resolves itself into a choice of a standard module or unit from a flow under two conditions:

1. With a low head of 6¾ inches above the center of the orifice, giving a discharge of 1½ cubic feet per minute, with the advantage that it is already partially recognized as the miner's inch, and with the disadvantage that the flow is irregular.

2. With a head of 11½ inches above the center of the orifice, and a discharge of 2 cubic feet per minute, the flow being much more regular, but the quantity discharged new to the people.

Definitions of both inches are given, and a choice can be made, but the author favors the last.

Definition No. 1 of the miner's inch: The water taken into a ditch or sluice shall be measured at the ditch or sluice head. It shall be taken from the main ditch, flume or canal, through a box or reservoir arranged at the side. The orifice shall be fixed vertically at right angles to the delivering waterway, and the edges and corners shall be sharp. The vein shall be fully contracted. The distance between the sides and bottom of the orifice and the sides and bottom of the waterway shall be at least three times the least dimension of the orifice. The orifice shall discharge freely into air.

One miner's inch of water shall mean ¼ of the quantity which will discharge through an orifice 2 inches wide and 2 inches thick, made in a 2-inch plank, planed and made smooth. The water shall have a constant head of 7¼ inches above the center of the orifice. It shall mean a discharge of 1½ cubic feet per minute.

Definition No. 2: The first part is precisely the same, the latter part is changed as follows: One miner's inch of water shall mean ¼ of the quantity which will discharge through an orifice 2 inches wide, and 2 inches thick, made in a 2-inch plank, planed and made smooth. The water shall have a constant head of 11½ inches above the center of the orifice. It shall mean a discharge of 2 cubic feet per minute.

A 1-inch orifice may run full, but no experiments were made on this point.

These discharges are from a standard brass orifice, and are actually 1.478 and 1.997 cubic feet per minute. The discharge through a wooden orifice 2 inches thick is slightly greater than for a standard orifice, so that these discharges should be almost exactly 1½ and 2 cubic feet per minute.

No attempt was made to reduce the observations to a common temperature. The temperature for the brass orifice varied between 31.7° and 46.5° F., a range of 9.5° with an average temperature of 48° F.

The temperature for the wooden orifices varied between 45° and 50° F., with an average of 48° F. The mean temperature for the whole was 45° F.

Every precaution was taken to remove disturbing effects, and to make the work as accurate as possible.

Altogether, some 235 observations were made in sets of from 2 to 5, involving a considerable amount of labor, but in the work and calculations.

Leaching Copper Ores.

A valuable article in last week's issue gives the latest concerning the leaching of copper ores, and, in general, methods of wet extraction.

There are ordinarily three classes of processes for the wet extraction of copper. In one the sulphide ores are roasted in heaps, driving off most of the sulphur, and converting the copper into sulphate which is leached out with water. Sometimes the lixiviated residue is reroasted with the addition of pyrites, and again lixiviated, the extraction thus being made more complete. This system, or class, includes the Longmaid, Henderson and Monnier process, so-called, or any way in which the copper is rendered soluble by subjecting the sulphide ores to a preliminary roast to remove most of the sulphur, subsequently adding a portion of common salt to the charge in the roasting furnace, by which the copper is converted into a chloride, or, with sulphate of soda, thus forming sulphate of copper.

Another class comprises those methods in which free hydrochloric acid, or sulphuric acid, is made the solvent for copper found in oxidized or roasted ores. Where the hydrochloric or sulphur acids are waste products such process might do, but, ordinarily, that method, while simple and efficient, is costly. There is a cognate method whereby the oxidized and moistened ores are exposed to the slow action of sulphurous acid mixed with air, thus forming soluble sulphate of copper. The copper is precipitated from its solution by the use of metallic iron; although milk of lime has been used as a precipitant, in such a case oxide of copper is produced.

A third class of wet processes of copper extraction comprises such methods as the one in which a hot solution of ferrous chloride, with common salt, is used to chloridize the oxidized copper and convert it into a mixture of cupric and cuprous chlorides, which, though almost insoluble in water, are dissolved by the help of the sodium chloride. In the Hunt & Douglass process, from this solution the copper is precipitated by metallic iron, thus reproducing the ferrous chloride, which is used as the solvent. This method is also suited to the extraction of copper from oxidized ores containing copper carbonates and the hydrous silicate of copper (chrysocolla). It is pointed out by Furman that when applied to the treatment of ores containing silver, the use of the bath of ferrous chloride has, in common with the method of roasting with salt, the disadvantage that it converts the silver into a chloride which is soluble in the strong solution of sodium chloride, and is then with difficulty separated from the chlorides of copper. This has been successfully overcome by a method which depends upon the action of sulphurous acid on copper sulphate, in solution with enough chlorine to produce cuprous chloride. This pure copper salt (which is insoluble except in a strong chloride solution) readily separates on the injection of sulphurous acid gas from a roasting furnace. If the gas is not diluted by too much air, acid is simultaneously generated in excess of the equivalent quantity, due to the unavoidable, though desirable, presence of free oxygen in the injected gases. The subchloride is susceptible of being reduced by iron to cement copper, and the chlorine recovered as chloride of iron, or to suboxide by lime, and the chlorine recovered as calcium chloride, the gold or silver remaining with the iron oxide in the matte or ore residues.

Always Advisable.

Is it necessary to record assessment work on a quartz mining claim in this State to hold it legally?

Baker City, Or., Dec. 30.

No. But to make affidavit of the fact that the work necessary to hold the claim was done, and to duly record it, would furnish direct evidence of the fact that might save expense and loss later on. It is always advisable to make such record, even though, as in Oregon, there is no State law requiring such record.

The Cost of Mining*

This is something which can never arbitrarily be determined until the character of the mine has been demonstrated. The width and length of the ore shoot must be known, and the character of the walls ascertained. The probable quantity of water which will have to be handled is always problematical, and, as a matter of course, the character of the walls and vein material itself will determine the method and expense of timbering. It is not uncommon to hear it said that in California mining and milling can be accomplished, under favorable conditions, for less than $1 per ton; but these conditions so rarely obtain, even in California, as to scarcely be worth mentioning, for they by no means constitute or illustrate the typical features of California mining. There are mines in slaty rocks, not particularly hard, where the veins are 3 to 7 feet in width, which, being worked through tunnels and having free water power, are operated at a very low cost; but even this class of mine does not represent the majority—indeed, such constitute a very small minority.

In the greater number of mines in California operations are conducted through shafts, which necessarily increase the expense of mining. In the central gold belt the mines vary so greatly in size, depth, character of ore and wall rocks, and quantity of incoming water, that a statement of cost would convey but little information, and comparison would be valueless unless accompanied by a complete knowledge of existing conditions and an itemized cost sheet. At a number of larger mines elaborate cost sheets are kept, and to a number of these the writer has been given the freest access. The cost of mining in the larger mines, under ordinary conditions, may be fairly represented by the cost sheet of the Wildman Company, at Sutter Creek, Cal., which has been kindly furnished by the superintendent, John Ross, Jr.

Detailed average cost of mining one ton of ore for the years 1896, 1897, 1898, at the Mahoney mine of the Wildman Company:

	Total Cost for 134,886 Tons.	Cost per Ton. Cents.
Timbers	$24,499 18	18.163
Spiling	4,913 05	3.642
Lumber	1,017 57	.755
Charcoal	1,242 01	.92
Candles	1,840 59	1.365
Powder	4,386 75	3.252
Fuse	780 16	.578
Caps	186 05	.138
Water	7,538 00	5.589
Freight	1,338 42	.992
Iron	1,224 24	.908
Steel and steel rails	1,417 27	1.05
Hardware	3,139 48	2.328
Oil	775 37	.575
Grease and tar	117 27	.087
Coal	229 57	.170
Miscellaneous	3,241 69	2.403
Power drill machinery	2,346 90	1.740
Surveying	667 50	.495
Cement	15 00	.011
Insurance	103 77	.077
Taxes	737 63	.547
Wire rope	636 28	.472
Office supplies	97 67	.072
Superintendence and labor	160,003 58	118.621
Totals	$222,495 00	164.950

JOHN ROSS, JR., Superintendent.

Detailed average cost of milling one ton of ore for the years 1896, 1897, 1898, at the Mahoney mill of the Wildman Company:

	Total Cost for 134,901 Tons.	Cost per Ton. Cents.
Shoes	$2,310 00	1.712
Dies	2,078 63	1.541
Screens	441 97	.328
Quicksilver	870 14	.645
Hardware	1,199 05	.889
Water for power	10,699 60	7.931
Freight	1,064 00	.789
Cyanide potassium	162 00	.120
Wood	220 88	.164
Charcoal, iron and steel	97 74	.073
Oil	63 95	.047
Grease	23 13	.017
Lumber	67 34	.050
Miscellaneous and coal	1,529 46	1.134
Timbers	17 95	.013
Assay supplies	516 59	.382
Office supplies	275 73	.204
Expressage, bullion	391 16	.290
Hauling and loading sulphurets	2,354 65	1.746
Silver plating plates	281 50	.208
Insurance	423 14	.314
Taxes	701 11	.520
Plates	86 49	.064
Superintendence and labor	16,791 58	12.447
Totals	$42,667 79	31.628

The above cost includes all repairs and equipment.

JOHN ROSS, JR., Superintendent.

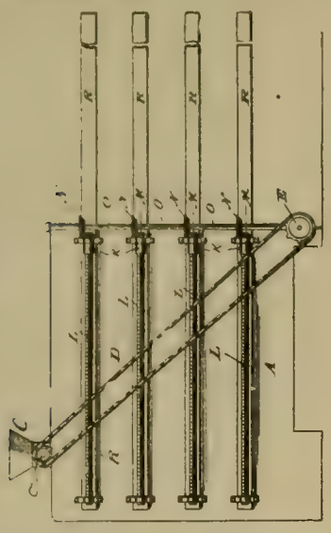
* California Mining Bureau Bulletin No. 18.

OWING to the funds appropriated for the field work of the California Mining Bureau being exhausted, Mr. W. L. Watts, of the State Mining Bureau, will undertake the examination of oil or mineral lands for mining companies or others who may desire his services.

Mining and Metallurgical Patents.

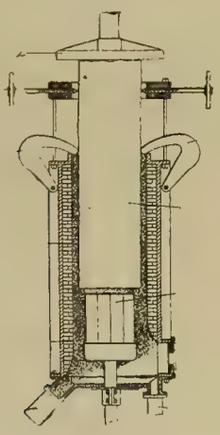
Patents Issued December 25, 1900.

ORE-ROASTING FURNACE. — No. 664,153; F. W. Holtman, Richmond, Va.



Ore-roasting furnace, having vertical series of beds therein, walls slotted horizontally adjacent to upper surfaces of beds, sleeves and rack bars supported thereby, rake teeth carried by bars, interiorly threaded nuts having integral shank portions connected to sleeves, designed to travel in slots, worm shafts working through nuts, shutters fastened to opposite edges of shank portions of nuts and designed to close slots and slide against outer walls of furnace, as racks reciprocated over beds, means for rotating worm shaft.

ELECTRIC FURNACE.—No. 664,333; J. M. Morehead, Chicago, Ill.



Electric furnace provided with hood having gas-tight sides and top, opening in bottom for removal of product, conductors of opposite polarity projecting through hood, means for embedding skirt of hood in packing material, thereby establishing and maintaining seal for preventing ingress of air to hood, directing and confining gas in hood, means for removing gas from hood.

TREATING WHITE LEAD.—No. 664,437; T. C. Sanderson, London, England.

Improvement in direct treatment of white-lead pulp precipitated from basic acetate solution without intermediate washing, consisting, first, in partially removing mother liquor; secondly, separating remaining mother liquor by adding considerable excess of oil; thirdly, expelling excess of oil and separated mother liquor by pressure in cold; fourthly, reducing proportion of oil in final product to required limit.

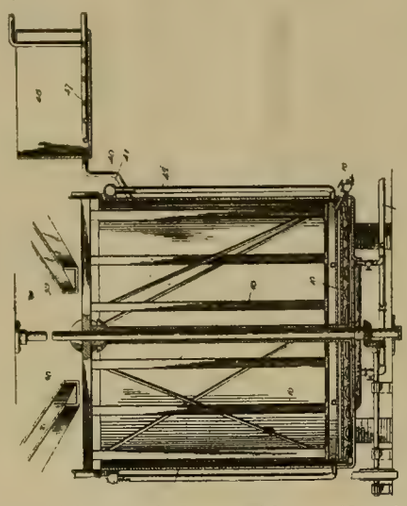
BATH FOR RENDERING ORE FRIABLE.—No. 664,488; K. Miller, London, England.

Composition of bath for rendering friable red-hot ore dipped therein, consisting of mixture of solution of equal quantities of sodium carbonate and caustic soda having density of 15° Baume, and about 1½% peroxide of hydrogen.

MACHINE FOR COLLECTING PRECIOUS METALS FROM RIVER BEDS.—No. 664,626; J. R. Dake, Merrill, Wis.

In a machine for collecting gold from water beds, frame, float, means for anchoring frame and float, air chamber rigidly connected to frame, shaft mounted in frame, current operated wheel mounted on shaft, sprocket wheel on shaft, guide board having swinging connection with shaft, sprocket wheel carried at outer end of guide board, sprocket chain extended around sprocket wheels, buckets on chain, means for raising and lowering guide board, swinging sluice into which buckets discharge, means for continuously swinging sluice.

PROCESS OF EXTRACTING PRECIOUS METALS FROM THEIR ORES.—No. 664,060; J. P. Schuch, Jr., Cripple Creek, Colo.



In combining crushed ore with cyanide solution while both are in warm condition, mechanically mixing ore and solution by agitation simultaneously with commingling thereof, charging mixture during agitation with hot air, finally separating ore and slush or pulp from metal in solution.

TRIPOD.—No. 664,502; P. H. Reardon, San Francisco, Cal.

In a support for rock drill, combination of cylindrical head comprising two parts A and A′, each provided with an integral arm, leg hinged between arms, each of parts A and A′ having at its outer end an integral boss, cap adjustably secured to each boss, leg hinged to each cap and movable at an angle to plane of movement of cap, means for securing legs.

PROCESS OF EXTRACTING COPPER.—No. 664,537; J. Douglas, New York, N. Y.

Process of reducing copper ore and matte, which consists in electrolyzing solid cuprous chloride, employing gases evolved in treatment of copper ore and matte, employing electrolyte resulting from electrolyzing of solid cuprous chloride as solvent for cuprous chloride so produced, recovering copper from solution by electrolysis.

ORE SEPARATOR.—No. 664,635; A. C. Hartung, Galena, Kans.

Combination with rotating table, scraper arranged over and adapted to work on table, standard secured to scraper and adapted to slide vertically, support or bearing for standard, lever having jointed connection with standard and adapted to swing in vertical plane, device for locking lever in any adjustment.

ELECTRO-MAGNETIC ORE SEPARATOR.—No. 664,650: E. Kreuser, Mechernich, Germany.

In an ore separator pair of closely placed co-operating rotary cylindrical electro-magnets recessed at points intermediate their ends for inducing coils, winding of one coil being opposite that of other, whereby magnetic lines of force are produced directly in co-operating magnets, so that path of magnetic flux forms shortest possible closed circuit, and lines of force pass through a single air space constituting magnetic field, connections between coils and source of energy which permits rotation of cylinders and coils therewith.

ORE SEPARATOR.—No. 664,768; A. R. MacDonald, Jr., Montreal, Canada.

A sluiceway for ore separators, comprising sluice; series of depressions formed therein; semi-cylindrical bands extending therefrom, in series, bands extending around lower side of depressions, the ends of bands of alternate series being joined, whereby material passing over sluice will be given backward rotary movement, movement being in opposite directions during passage of successive series of bands.

GRADING AMALGAMATOR.—No. 664,712; A. Z. Baldenebro, Mexico, Mexico.

Apparatus for grading ores, comprising series of funnel-shaped vessels, water-supply pipe leading into each vessel and provided with spraying device adjacent to tapered bottom of vessel, overflow channels connecting vessels, interior lateral channel extending downward from inlet of each vessel along inclined wall thereof and tapering toward its lower end, outlet of channel terminating above spraying device, forward wall of channel having convex inner face corresponding with opposing concave inner face of receptacle forming rear wall of channel, valve-controlled pipe leading from side of each vessel near bottom, channels to which pipes lead, and valve-controlled outlet for bottom of each vessel.

Rhodium Alloys.

A specimen piece of pure rhodium wire, exhibited by Heraeus of Hanau, in Paris, indicates that this metal has only quite recently been prepared in sufficient quantities to study its metallurgical character, although platinum-rhodium thermo-couples have been used for several years, says Engineering. Great attention is now being paid to the nature of alloys, and the rhodium alloys are not less interesting than others. According to Dr. Rossler of the gold and silver refinery of Frankfort-on-the-Main, rhodium appears to have been confused with iridium in some cases. We have two groups of platinum metals, the one with a specific gravity of about 12, the other with a gravity of about 22. Rhodium belongs to the first group, iridium to the second. If five milligrammes of rhodium are fused with one gramme of silver, melted in lead, the regulus resulting from cupellation is not as bright as silver, but dim gray. When the grain is dissolved in nitric acid this gray film disintegrates into fine, glittering scales, which float in the solution. These scales are fine hexagonal crystals of pure rhodium. When more rhodium is applied it is afterwards reobtained in the amorphous state. There is, therefore, no alloy of rhodium and silver, and rhodium is not soluble in silver, but it is soluble in lead. Iridium behaves similarly. The silver-iridium grain, resulting when the above-mentioned proportions are observed, has the bright color of silver, the much heavier iridium particles are imbedded in the bottom of the grain, and when nitric acid is applied as solvent the iridium is again found crystallized, but the crystals rapidly sink in the solution. Larger proportions of iridium are not dissolved by the silver, and remain amorphous. On continued heating the iridium becomes oxidized. The case is quite different with silver and platinum. These two metals alloy, and when such alloy, containing only a small proportion of platinum, is dissolved in nitric acid, some of the platinum, which is itself insoluble in nitric acid, passes into solution with the excess of silver. Further, the platinum residue proves oxidized, and is then soluble in hydrochloric acid. Thus, an observation of Von der Ropp's is confirmed, and it has in fact been known that the anode mud, obtained in silver refineries from silver containing both gold and platinum, on the Moebius process, leaves an oxidized platinum residue behind, soluble in hydrochloric acid. Ropp found water, oxygen and nitrous acid in this residue. The rhodium gold alloy resembles this platinum silver in these respects. It is prepared like the rhodium silver alloy, and dissolves in aqua regia with a darker color than gold alone would give. The properties of rhodium are evidently influenced by a large excess of gold. If more rhodium (above 5%) is forced into the gold, which requires long-continued fusion, the excess of rhodium is afterwards found in beautiful star-shaped or feathery needles, easily distinguished from the gold by their gray color. Gold and rhodium seem to form a real alloy, but it has not been isolated so far. To investigate the question further, Rossler prepared alloys of rhodium with bismuth, tin and antimony. The metals have to be heated above their melting points for some time. Bismuth takes up 5% maximum of rhodium. When the excess of bismuth is extracted with cold nitric acid, crystals of $Rh\,Bi_4$ remain behind, which are themselves soluble in boiling nitric acid. The same crystals can be prepared by fusing together the respective proportions of the two metals corresponding to that formula, and those crystals are entirely soluble in hot nitric acid; no bismuth can then be extracted with cold acid. An excess of rhodium is afterwards found in the crystallized or in the amorphous state; the amorphous metal had evidently not been taken up by the fused mass.

Silver Plating Copper Plates.

TO THE EDITOR:—In regard to how copper plates are silver plated, the silver is deposited on the plates by the electro-plating process. A solution is made of the proper proportions of either cyanide or chloride of silver, cyanide of potassium and water. The copper must be thoroughly cleaned, then immersed in the solution, and attached to the negative pole. The sheets of silver called anodes, to feed the solution as the silver is deposited on the plates, are attached to the positive pole. The solution being a conductor of electricity, the current passes through from the anodes to the copper plates, and the silver is deposited. Care is necessary that the proper amount of electric current is used, and everything must be in proper condition to insure success. We are extensively engaged in the manufacture of silver-plated copper mining plates, and would be pleased to have you call at any time and see the process. E. G. DENNISTON.

743 Mission street, San Francisco.

MINING SUMMARY.

Specially reported for the MINING AND SCIENTIFIC PRESS.

ALASKA.

A Mint estimate of the gold and silver production of Alaska for 1900 is: Gold, $7,771,048; silver, $197,135, of which total Nome contributed $5,000,000.

A 30-stamp mill, with room for ten additional stamps, will go in at the Sea Level, near the head of Thorn Arm, on Revillagigedo island, 24 miles from Ketchikan.——The new 12-drill compressor for the Julian, Juneau, is going in.——The Chicago & Sitka M. Co. of Sitka expect to put in its new mill next spring.——A new tram is going in on the Lucky Chance; Supt. E. O. Smith is pushing work.

Ore from a 30-foot ledge, now being developed near Wrangel, shows an average of $43 to the ton.——At a depth of 150 feet a strike of ore which assays $1500 to the ton is opened up in tunnel No. 2 of the Cracker Jack.——On Prince of Wales Island the Mt. Andrews M. Co. has twenty men working on the Lichtenstadter properties; copper ore is being shipped.——The Valparaiso Co., at Port Johnson, Prince of Wales Island, recently shipped thirty-one tons ore which returned $180 to the ton.

It is stated that the output of gold from the Minook mining district, near Rampart City, for 1900 is $500,000.

Large oil fields are reported found between Dry Bay and Yakutat; a Seattle, Wash., company will develop them.——A strike of good ore is reported opened up on Coronation Island.

ARIZONA.

The estimated gold and silver production of the Territory for the year 1900 is given as follows: Gold, $4,936,000; silver, 4,250,000 ounces. The copper output for the year is put at $30,000,000.

GILA COUNTY.

Returns from a carload of ore recently shipped from the Copper Hill, at Globe, indicate 21.5% copper per ton.——The Bernard McCoy estate, consisting of three whole claims and part interest in five others, is sold to C. E. Taylor of Globe. Mr. Taylor will push work on the properties.——The balance of the machinery for the Black Warrior concentrator is on the ground and construction work is under way; the new roll, recently put in, is said to be the largest ever placed in a mill in Arizona. The leacher is running, and acid works are the next addition contemplated.——B. Haverly is shipping high-grade ore from his claim, adjoining the Black Warrior.

The Black Warrior, Globe, has fifty men working.

GRAHAM COUNTY.

The shipping ores from mines near Clifton average about 12% and the concentrating ores average about 4% copper to the ton.——There are about 1200 feet of tunnels, drifts, etc., on the Medler.——A tunnel is driven on the Indiana, owned by the same company, the Medler M. Co.——The Arizona Copper Co. is putting in a new foundry on Chase creek.——Work on the new 200-ton concentrator at Longfellow is progressing favorably.——There are estimated to be 100 mines in the Clifton district, with a daily output of $22,850.——Ten cars of cement for use on the new concentrator of the Medler Co. at Clifton are on the ground.

MOHAVE COUNTY.

The New England & Arizona M. Co. will put machine drills in at the Sheeptrail and Homestake mines.——The main shaft on the Occident, at White Hills, is down 740 feet on the incline; the mill is running twelve hours per day.——The framework for the new concentrator at the Tennessee, at Chloride, is up and ready for machinery; work in the mine is being pushed, and ore from the 400-foot level is being taken out.——The Elkhart, after a year's shutdown, has resumed operations; forty men are employed. The 200-ton concentrator is running and shipments of high-grade concentrates will soon be made; T. B. Comstock, manager.——H. L. Frank is pushing work on the Mollie Gibson; the shaft, now down 80 feet, will be sunk to the 500-foot level.——The Lucky Boy is mining ore running $300 to the ton in gold, silver and copper.——The Philadelphia & Arizona M. Co. is crosscutting on the Minnesota, recently bought from J. Barry; ore from the dump is being hauled to the Merrimac 10-stamp mill, 4 miles away.

The Kingman Sampling Works were burned on the 2nd inst.; loss, $12,000; the fire originated in cars occupied by drunken tramps.

J. Jackman is driving a tunnel on the old Overland, in the Wallapai mountains, near Mohave. The tunnel is now cutting the ledge at a depth of 75 feet.

SANTA CRUZ COUNTY.

The McKinnie-Davis combination of Colorado Springs, Colo., is pushing work on the Patagonia, near Nogales. The shaft is down 110 feet and the tunnel is in 133 feet. Shipments of silver-lead ore are being made.——Owing to a lack of water, the mill at the Tres Amigos mines is closed down. Work in the mines, however, is progressing satisfactorily. The deepest shaft is 130 feet. The ore is said to average $6 to the ton. A second winze is being sunk.——At Washington Camp the big mill is running steadily on ore from the Pride of the West; Supt. E. Gee.——The Mowry mill is running satisfactorily. Sixty men are employed.

YAVAPAI COUNTY.

J. M. Sullivan has bonded his partner's interest in the Columbia group (copper). The crosscut tunnel is in 315 feet; the ledge is a contact between slate and porphyry, with iron croppings.

Sinking and drifting are in progress on the Empire group, in Groom Creek district; a new mill is in and running.——Three samples of ore from a property 2½ miles east of Cordes recently assayed, respectively, 28.8%, 21% and 9.1% copper to the ton.

The Brookshire and George A. Treadwell mining companies, operating near Jerome, have made final entry of the Missouri, Badger and Cliff groups, consisting of thirty claims.——On the old Venezia a crosscut is run to cut the main ledge of the Crook.——Air drills are going in on the Lottie, in Big Bug district. A 500-foot tunnel is being driven.——The ore body at the bottom of the 100-foot shaft on the Giant Reef at Congress is 3½ feet wide.——The shaft on the Angel is 9 feet deep. R. De Large of Dewey is working on the Omega, Altar and Imperial mines (gold-copper), in the Black hills, 6 miles south of Jerome. The incline shaft is down 80 feet. The ore runs $19 gold and 4% copper to the ton.——O. B. Marshall is crosscutting on his group in Big Bug district.——On the Hamilton, in Big Bug district, the tunnel is in 150 feet, giving a depth of 98 feet.——The shaft on the Cypress, in the same district, is down 220 feet.——The Butternut is shipping ore.——A depth of 550 feet is reached on the Henrietta.——Madden Bros. have leased the dump at the mouth of the Tunnen. They are putting up a jig and will begin jigging soon.——Sinking and crosscutting are being pushed on the Mineral Hill, near Huron.——The shaft on the Verde Queen at Jerome, now down 250 feet, will be sunk an additional 200 feet.——Two wells will be sunk on the Maguire, which are expected to furnish enough water to run the projected 100-ton mill.

CALIFORNIA.

A Mint estimate of the gold production of California for 1900 is $14,377,186; silver, $562,293.

The receipts of quicksilver at San Francisco in 1900 and 1899, both years ending November 30, were as follows:

Years.	Flasks.
1900	21,136
1890	23,819
Decrease, 1900	2,683

The following shows the receipts for a number of years ending December 31:

Years.	Flasks.
1899	23,893
1898	23,371
1897	18,143
1896	24,617
1895	31,519

The exports from San Francisco by sea in 1900 and 1899 were as follows:

Years.	Flasks.	Values.
1900	7,034	$330,026
1899	10,130	397,400

In the past year the exports were distributed as follows:

To—	Flasks.	Values.
Mexico	4,381	$203,422
Central America	1,464	67,722
Australia	150	6,950
China	1,000	50,000
British Columbia	12	589
Siberia	7	343
New York	20	1,000
Totals	7,034	$330,026

Up to February, 1899, there had been no shipments to China since 1896, that country in former years having been the largest consumer of the California product. Since 1884 London has been the chief customer in that market. During the year ending December 31, 1899, the exports by sea comprised 4000 flasks to China, 3706 to Mexico, 1780 to Central America, 450 to Australia, 44 to British Columbia, 2 to Siberia, 5 to New Zealand, 50 to Peru and 118 to New York.

AMADOR COUNTY.

Ten stamps are dropping at the South Spring Hill, Sutter Creek.——In a crosscut on the 400-foot level of the Mutual good ore is opened up; Supt. Porter.——Twenty stamps are dropping at the Central Eureka. The new steam hoist is running.——Preparations are being made at the Gwin to sink for another level below the 1600-foot level. Eighty stamps are in operation. The monthly output is nearly 10,000 tons of ore.——Unwatering and retimbering of the main shaft is in progress at the Bunker Hill. The shaft is pumped out to the 800-foot level, and retimbered for 750 feet. Sinking will begin from the 800-foot level soon; Supt. Downs.——Drifting is in progress on the 500, 650 and 1200-foot levels of the Lincoln. The drift on the 650-foot level will be run an additional 200 feet to cut the ore shoot. Winter supplies are in and work will be pushed.

BUTTE COUNTY.

The new derrick for the Hesperian Crude Oil Co., at Richardson Springs, near Chico, is completed.

CALAVERAS COUNTY.

The business and mining men of West Point contemplate a smelter at that place.

The shaft on the Ophir, at Carson Hill, is down 300 feet; a 40-stamp mill is projected.

C. C. Clark of the Gold Hill M. Co. states that operations on the Gold Hill (gravel), on Esperanza creek, 8 miles from Mokelumne Hill, will soon begin.

EL DORADO COUNTY.

M. L. Smith has bought a 5-stamp mill near Mosquito, and will put it on the Rosebud, near Fairplay; a steam drill will go in also.

The Eagle G. M. Co., Supt. G. E. Walker, operating near El Dorado, will continue operations through the winter. Monthly clean-ups will be made.

INYO COUNTY.

Work is in progress on the Emily Enot, near Bishop.——The Menlo & Belmont group, consisting of seven claims, and the Imperial & Royal and the Empire group of ten claims, in Argus district, are sold to C. A. Burcham for $25,000.

KERN COUNTY.

The Monte Cristo Oil Co., at Bakersfield, has finished its pipe line.——The Globe Oil Co. is figuring on building a pipe line from its wells to the Peerless works, and making use of that company's line to the railroad.——The Kern King Oil Co. expects to begin drilling soon at McKittrick. The well of the Edgar Oil Co., on 18, 28–28, in Kern River district, is finished at a depth of 1340 feet.——McKittrick well No. 2 is down 450 feet.——The S. W. quarter of the N. E. half, 11, 28–27, is sold to the Provident Co. for $11,000.——The Valley View Oil Co., of Selma, will begin work on 12, 28–27, as soon as a rig is put in.——The Cal. & Colo. Oil Co., of Colorado Springs, Colo., will work the S. W. quarter of the N. W. quarter of 35, 12–24.

Near Sunset, Clark, Bryan & Wilson have struck oil sand at a depth of 500 feet.

The Edgar Oil Co., drilling on 18, 28–28, near Bakersfield, has struck a stratum of oil sand.——Near Bakersfield, the Cantua well, on 14, 28–27, is down 1073 feet.——The Petroleum Center No. 3 is down 600 feet.

The Blue mine at Kernville, lately sold, will be reopened, after lying idle for seventeen years. Electricity will be used for light and power.

KINGS COUNTY.

The Kings County Oil Co., failing to find oil back of Hanford, has moved its Standard rig to the northwest quarter of section 16, 29–29, near there, and will start a 14-inch hole.

LOS ANGELES COUNTY.

The Union Jack Oil Co. is drilling a second well on Belmont street, Los Angeles.——The Parker Oil Co. is deepening a well on Edgeware road and Omaha street.——The Dry Lake Oil & M. Co., capital $50,000, is incorporated at Los Angeles.

MONO COUNTY.

The electric plant of the Crystal Lake M. Co. at Lundy is running satisfactorily. The lower tunnel, now in 200 feet, is progressing rapidly. Ten stamps are dropping, and ten additional will be soon.——The mill at the Bodie tunnel, near Bodie, is being put in shape for a run on ore from that mine.

NEVADA COUNTY.

The Tule Belle, at Grass Valley, is producing good grade ore.

At the Providence, near Nevada City, operations are going forward on the 1800-foot level.

PLACER COUNTY.

Electric power will be used at the Southern Cross (quartz), near Colfax; a dam is being built in the American river.——The new tunnel at the Jupiter (gravel), on Iowa Hill, is in 260 feet; eleven men are employed.

RIVERSIDE COUNTY.

The Crystal Spring M. & M. Co., capital $3,500,000, is organized to work what was formerly known as the Midnight Owl at Kenworthy; J. L. Harman, of San Jacinto, Supt.; an 800-foot crosscut tunnel will be run to strike the ledge; $50,000 are raised for development purposes.

SHASTA COUNTY.

The Trinity Copper Co. is the title of a Boston corporation floating the stock of a property 8 miles from Copley which gives promise of being of value, though the thing is enormously overcapitalized—$6,000,000. It was formerly owned by Galvin & Filius and now includes the old Hearne property.

The foundry and machine shops of the Mountain Copper Co., at Keswick, will build a pump with a daily capacity of 1,000,000 gallons of water for use in increasing water supply at the smelters at that point.——Work on the 9-mile branch to be built by the Trinity Copper Co. of Boston, to connect the King Copper and Shasta groups (copper) and smelter with the S. P. R. R., will probably be started early this year; the company has just bought the Pine Flat, Wash Boulder, Motion Creek and United Placer placer claims in Section 29, Township 33 north, Range 5 west, near Redding, comprising 430 acres.

SIERRA COUNTY.

The shaft at the Sierra mine, Downieville, is down 110 feet; sinking pump 45 feet will give a pressure of 465 feet and permit a further sinking of shaft to 175 feet.

SISKIYOU COUNTY.

Supt. G. Seward reports ore in the upper tunnel of the Square Deal, on Deadwood creek, near Yreka; a tunnel is being run to tap it, and, if ore continues good, a mill will be put in.——The new mill at the Dewey, Gazelle district, is nearly completed; lower tunnel is being extended.——Work on the Eastlick, Oro Fino district, is resumed, as late rains have filled the ditch system.

At the Willard, in Hamburg district, equipment is going in.——The Hammer-Loan, same district, has resumed, water being sufficient to supply a 3½-inch nozzle.——The Maplesden, on Nigger creek, Hamburg district, will resume.——In Scott Bar district the lower tunnel on the Russell has cut the ore; the mill is running steadily.——The steam dredger at Hawkinsville is closed for the present.

New machinery will go in on the Hair Oil and Last Chance mines, at Callahans; the mines will be worked by a method devised by Pres. McFadden; a shaft will be sunk to bedrock and will be made water-tight by bands of sheet iron; water will be kept out and drifting will be begun from bottom of shaft; the company will probably build a dredger.

All claims on streams near Happy Camp are being worked.——Drifting is in progress at the bottom of the shaft on the Greenhorn No. 2 (blue gravel).

TRINITY COUNTY.

The Sweepstakes claim, 4 miles southwest of Weaverville, is an ancient channel several miles in extent. Tests indicate 25 cents per cubic yard; the gold is coarse, black stained near bedrock; a hydraulic plant will be constructed; F. H. Hall is general manager, 108 Crocker building, San Francisco.

Gilzeau & Davis recently opened up an old channel of gravel on the right side of Canon creek, opposite Pennsylvania Bar.——C. W. Spratt & Co. have uncovered a 15-inch ledge on property adjoining the Chloride group on Canon creek.

C. D. Galvin is pushing work with his new dredger at Weaverville.——It is said that the gravel deposits on the Last Chance will require more than 75 years to exhaust.

TUOLUMNE COUNTY.

At the Mt. Jefferson mine twenty stamps are now dropping; at 300 feet in depth the ore vein is 14 feet in width, 7 feet nearest the hanging wall and 7 feet on the footwall; the sulphurets average 7%, value $40 per ton; chlorination works will be erected; J. M. Meighan is general mgr.

It is locally reported that the Street, at Tuttletown, will be reopened.——Supt. Long is pushing work on the Tri-Color; the drift on the 200-foot level is in 80 feet; a tunnel is being run from the mill towards the hoist; a rock crusher will be put in.——J. Meighan is to take hold of the Accident, at Big Oak Flat, and develop it.——On the Feciliana, east of Stevens Bar, Supt. S. E. Ball has men working the property.——The Republican Co. has finished its tramway, and is conveying ore to the 10-stamp mill on the Mammoth.——The shaft on the Clio is down 300 feet; three eight-hour shifts are working.——Oil is being used as fuel at the Clio and Willetta mines.

Supt. Restano is pushing work at the Golden West at Sonora.

VENTURA COUNTY.

Work on the Home Oil Co.'s well, south

of Santa Paula, is progressing satisfactorily; well is down 500 feet.——The Tapo Oil Co. is drilling well No. 3.

YUBA COUNTY.

The Clark mine, at Brownsville, is to be reopened by New York and Boston men, represented by J. O. Stewart of Danville; the mine is bonded for three years; the incline will be retimbered and latter will be connected with mill by means of a hoist; the lower tunnel, now in 500 feet, will be continued to make connection with the old main shaft; the 10-stamp mill now on the property will be remodeled, four new concentrators and a canvas plant added; twenty-five men will be employed.

COLORADO.

The mineral output of Colorado for the year 1900 is estimated as follows:

Gold	$35,183,457
Silver	15,445,398
Lead	7,317,810
Copper	2,341,379
Iron	5,684,620
Zinc	1,045,000
Coal	9,625,000
Oil	250,000
Total	$76,892,664

The output of coal in the State for 1900 was 5,470,734 tons, an increase of 643,795 tons over that of 1899.

CLEAR CREEK COUNTY.

The Peters tunnel, Idaho Springs, is to be operated under new ownership. A new gasoline engine is in. The tunnel is in 270 feet.——The De Lesseps, in Gilson gulch, will resume. A gasoline hoist will be put in the winze, which will be sunk in a good body of ore, and the adit will be driven ahead. Sinking of the Black Lion shaft is under way. The ore is high-grade silver.——It is said that parties are figuring on the erection of electric power plants at Idaho Springs to supply the mines and mills with that kind of power.

EL PASO COUNTY.

The Rio Grande sampler at Colorado Springs recently sent out sixty-seven carloads—or 1730 tons—of ore worth in the aggregate $103,000.

HINSDALE COUNTY.

Work on the Tobasco group, on Cinnamon mountain, near Lake City, will be continued until spring, when operations on a large scale will begin.——At the Golden Fleece mill the Huntington mills are placed in new positions under large storage bins. New surface sizers are in; a new mill will go in soon. The canvas tables, which are placed below the concentrating tables, are effecting an additional saving of $100 per day.——Thirty men are working at the Black Crook.

LAKE COUNTY.

The Maple Street shaft of the Maple Street M. Co. is on the California Gulch flat and is down 300 feet, with sinking still in progress.

The California Gulch shaft has reached a depth of 535 feet, which is about 80 feet lower down than the lowest workings in the Bon Air, which joins the former property on the north. The shaft is two-compartment, with good hoisting facilities. On the 400-foot level is a Jeanesville pump and a Knowles pump at the 530 station; also, a bucket and sinking pump at the bottom. At present 400 gallons of water per minute are being handled. The boilers aggregate 245 H. P., and the friction hoist is good for 1000 feet depth. In sinking the California Gulch shaft a 50-foot stratum of dolomite sand was passed through, which made the work difficult. From the bottom of the shaft drifts are being run in all directions prospecting for ore.

The Weldon, Nubian and Morocco mining companies are all under one management. The Weldon mine, which occupies a location just east of Bon Air, on Carbonate hill, is shipping fifty to seventy-five tons per day, and Manager Schlessenger states that this will be increased. The Weldon shaft house, which was destroyed by fire last August, has just been rebuilt and the work in the mine resumed. The normal output here is 150 tons per day. The Nubian group, on which are two shafts, joins the Weldon on the southeast and ships sixty tons per day. The Weldon and Nubian ores consist of lead carbonates and oxidized iron ores, making a good silver-lead product. The bulk of the tonnage comes from 560 to 600 feet depth, the same as in other mines on Lower Carbonate hill. The grounds of the Morocco Co. are in California gulch, just southwest of the Bon Air. On this property the A. V. shaft is being sunk as a prospecting project.

Leadville, Jan. 1.

On the Home group the Penrose shaft has been sunk from the 540 to the 600-foot level, and through the workings on the latter access is obtained to the present known ore body. From the bottom of the shaft a main level, mostly in ore, has been run 400 feet northward. It is timbered up, electric lighted and provided with double tracks for ore cars. From this main level crosscuts are being run eastward and westward, cutting through and in some cases under the ore body. From these crosscuts upraises are being cut toward the open workings at the 540-foot level. There are five of these crosscuts penetrating the ore on the east side of the main level, and seven on the west side. By this it will be seen that a body of ore approximately 400 feet square, on a horizontal plane, is in a fair way to be blocked out in square sections. The ore body, thus encompassed, appears to be one of continuity, with the exception of here and there a roll of lime; present workings also indicate that it has a vertical extent of 40 or 50 feet, allowing for variations and irregularities in the formation. A similar stratum of ore has been stoped out on the 540 level to the extent of about 300 feet square. At present, all work is north of the shaft, but it will proceed into the Home ground southward at a later date. Near the bottom of the shaft a pumping station is being cut out, which will be 12x15x63 feet, where a duplex compound pump will be put in position before the first of the year. At present a pump of smaller capacity is handling the water, the volume of which is diminishing. About 225 tons per day of ore are being hoisted from the Penrose and 100 tons from the Bon Air and Star. In general, these ores are an oxidized iron and manganese, averaging about eight ounces silver, the allowance for excess of iron and manganese being sufficient to offset the treatment charges at the smelter. There are, however, frequent streaks of lead carbonates.

Leadville, Jan. 5.

The mineral output of the Leadville district for 1900 shows a gain of nearly $4,000,000 over that of 1899, with a tonnage of over 820,000 tons of ore. The valuation of all metals produced is given as follows:

Gold	$ 2,850,146
Silver	4,627,044
Lead	2,704,576
Copper	445,286
Spelter	1,867,742
Manganese	141,000
Bismuth	240,900
Total	$12,876,694

Twenty-five leasers are working the Gallagher at Leadville. From 700 to 1000 tons of ore are taken out monthly.——A. Boyd of Leadville is sinking a new shaft on the Fanchon, in Sugar Loaf district.——A new furnace will be in blast at the Boston smelter, Leadville, shortly. —— A boiler and pump will go in at the Valentine No. 1 shaft.——Work on the shaft at the mouth of Iowa gulch will be resumed; W. A. Clark of Montana owner.——A shaft is going down at the Kubera.

LA PLATA COUNTY.

The drift on the Waterloo to intersect the Bluff is in 208 feet.

MINERAL COUNTY.

The Ridge at Creede is running again, the pumps having been put in good shape.——The new electric hoist for the Commodore shaft No. 5 is in and hoisting will soon begin. The shaft, now down 50 feet, will be sunk to the Nelson tunnel level.——The ore body in the South No. 10 drift in the United States has opened out again and ore is shipped. In the north drift the ore body is opened up for 300 feet of an average width of 10 feet.——The crosscut on the Reno at Sunnyside is within 40 feet of the shaft.

PARK COUNTY.

C. Gumaer is pushing work on the Never Sink, on Hoosier pass, near Alma.——The Good Samaritan, operated by the Orphan Boy Co., is shipping ten tons of ore per day.——Parker and others recently opened up $45 ore in the old shaft of the Buckskin.

PITKIN COUNTY.

Two feet of lead ore are reported opened up in the Anaconda, on Porphyry mountain, near Aspen.

SAN JUAN COUNTY.

An auxiliary steam plant is going in at the Kendrick-Gelder smelter at Silverton.——E. Jones has run his crosscut tunnel on Hazleton mountain 200 feet. An additional 100 feet will cut the lead.——The Minnie Gulch Tunnel Co. is running a tunnel on 6 feet of ore. Seventy-five men are working.——A 60-foot tunnel will be run on the Old Time mine, Bear mountain. The ore is said to run $50 to the ton.——A 75-foot shaft is sunk on the Mayflower, on Boulder mountain. The property may soon be sold.——Manager J. Woods states that the Marcella crosscut tunnel, on the lower end of Kendal mountain, is in 445 feet.——Four electric drills will go in on the Champion No. 2, on Sultan mountain, near Silverton, and a 700-foot crosscut will be run.——Surprise No. 2, in Cascade basin, is producing ore running $40 to the ton. A tunnel is being run.——On the Surprise at Eureka a 100-foot continuation of a 200-foot drift is being run. A 100-foot shaft is being sunk.——The crosscut tunnel on the Ivey, on Mineral creek, is in 145 feet. An additional 50 feet will have to be run to cut the lead.

SAN MIGUEL COUNTY.

There are 1800 feet of tunnels on the El Dorado group, in Roger basin, near San Bernardo. A tunnel to gain a depth of 1500 feet will be run in the spring.

SUMMIT COUNTY.

The mineral output of the county for 1900 is given as follows:

Placer gold	$ 175,000
Gold from ores	325,000
Silver from ores	275,350
Lead	220,972
Copper	9,680
Total	$1,006,010

The machinery for the new cyanide plant for the Cashier, at Breckenridge, is on the ground.

TELLER COUNTY.

The production of gold ore mined in the Cripple Creek district during year 1900 amounts to a total of 504,668 tons, with a valuation of $22,538,200. Itemized table follows:

Plant—	Tons.	Value.
Colorado-Philadelphia	102,180	$4,015,674
Metallic	93,000	2,212,500
National	33,000	1,039,500
El Paso	37,100	1,025,500
Economic	31,488	854,928
Arequa (Colo.-Or.)	25,000	750,000
Gillett	11,100	341,598
Brodie	5,000	107,000
Detroit	1,600	32,000
Atlas	1,200	39,500
Union (one month)	4,000	120,000
Total	344,668	$10,538,200
Smelters	160,000	12,000,000
Grand total	504,668	$22,538,200

Dividends paid in 1900 amounted to $6,181,286.71; dividends paid to date, $17,751,346.14.

The shaft house and office building, on what was formerly the Brady lease on the Burns, at Altman, were destroyed by fire on the 24th ult.; loss about $1000; shaft house and gallows-frame will be immediately rebuilt.——Work is being done in ten shafts on the Hull City, Victor.——The Gilpin, Creede & Cripple Creek M. Co. is sinking a shaft on the west end of the Atlanta.——Drifting is in progress on the 625-foot level on the Orpha Belle vein.——Ore recently opened up on the middle block of the Pauper, east of Altman, assays $11 to the ton.——On block No. 3 of the Deadwood, a shoot of ore was recently opened up, samples from which ran $1000 to the ton.

The old Elkton machinery is in on the Hoosier shaft, and work is in progress below the 400-foot level of the latter.——A new plant is going in on the Bob Lee, adjoining the Hoosier.——The Little Edith, on Battle mountain, is putting in new machinery.——The Solitaire Co., operating the Columbia, is saving ore for shipment, and the capitalization of the company is increased to $2,000,000; a hoisting plant will be put in immediately.——The shaft on the Hillside, Cripple Creek, is down 200 feet; good ore is being shipped.——Ore is opened up on the Vindicator at a depth of 880 feet; sinking will be continued to the 1000-foot level; a station will be cut at the 900-foot level.——The Bob Lee Co. has bought the old plant of machinery of the Alameda Co., at Gillett, and will put it on the Bob Lee, on Tenderfoot hill; the old 60-foot shaft will be continued to the 300-foot level.——The old plant of machinery, formerly used by the Margery Company on the May-Be-So, on Globe hill, is sold to the Federal G. M. Co., who will put it on the Colorado City, on Bull hill.

The working shaft on the Mayflower, north of Tenderfoot hill, Victor, now down 50 feet, will be sunk to the 300-foot level.——The ore shoot recently opened up on the 263-foot level of the Red Umbrella, on Raven hill, is now 2 feet wide; ore averages 2 ounces gold to the ton; drifting will be continued for 300 feet.

On the 24th ult., the Doctor-Jack Pot consolidation shipped two cars of $50-ore, and one car of 10-ounce ore; connection between the Doctor and Morning Glory shafts is expected to be made within 60 days.——The miners of the Portland, in addition to the wages for Christmas day, were each presented with $5 by President J. Burns.——Two feet of high-grade ore are opened up at a depth of 90 feet on the Stacy & Stafford lease on the north end of the Zenobia.

IDAHO.

The production of metals in Idaho during the year 1900 amounted to $14,150,000, an increase of $586,582 over 1899. The gold production, according to present estimates, fell off $500,000, while that of other metals increased. The figures for year are as follows:

Gold	$ 2,000,000
Silver	6,000,000
Lead	6,000,000
Copper	150,000
Total	$14,150,000

ADA COUNTY.

J. W. Cunningham, in charge of the United States Assay Office, at Boise, furnishes following statement of gold bullion bought during eleven months ended November 30, 1900:

January	$ 120,139 74
February	47,717 34
March	106,182 09
April	101,931 20
May	188,590 20
June	202,044 73
July	196,704 21
August	171,789 04
September	145,584 86
October	156,371 15
November	133,581 88
Total	$1,570,636.49

Owing to a scarcity of coal, several of the mines near Boise are closed down.

BLAINE COUNTY.

To Dec. 1, 1900, there were shipped from Wood River 2561 tons of ore worth $200,000.——The Crœsus (gold) at Wood River is temporarily closed down; it is said that a new mill will go in this spring.——Manager Lusk is pushing work on the Tip Top.——At Bradford, new machinery is in on the Minnie Moore.

BOISE COUNTY.

The new mill on the I. X. L., at Pearl, is giving satisfaction.——At the Checkmate the 300-foot level is being opened up, fifty tons of ore being taken out daily.

The Cripple Creek & Idaho Exploration Co. will work the South African (quartz), on Elk creek, Idaho City.——The 6x8-foot shaft on the Golconda is down 35 feet. A hoist and pump will be put in.——R. Z. Norcross is running a tunnel from Squaw creek towards the old Liberty.——Linsteadt & Ottenbacker are running a 200-foot tunnel on the American Girl (quartz), on More creek, 8 miles from Idaho City. An additional 300 feet will probably be run next spring.——Garrecht & Orchard are working the Iroquois, in Shaw's gulch, 3 miles southwest of Idaho City.——W. A. Magee is sinking a shaft on his claims on Shaw mountain, near Idaho City.

CUSTER COUNTY.

A strike of rich ore is reported made in the tunnel on property near Houston.——J. E. Leger of New Jersey and others, operating the Blue Wing, Lost Horse and other claims near Custer, will probably put in a new mill soon.

IDAHO COUNTY.

The Evergreen, Eureka and McArthur claims at Camp Dewey are reported bonded to Salt Lake men for $125,000. A mill will go in.

Work on the Alamance, at Elk City, will be resumed; Manager Bradford is putting in a new 45,000-gallon per hour pump, and other machinery.——Finch & Campbell are having a survey of the Ajax group made for a U. S. patent on same; a 240-foot shaft is sunk on the property, and free milling ore is being piled on the dump awaiting the erection of a mill which will probably be put in next spring.——D. Trullinger is reported to have made a strike on the Columbia No. 2 (quartz), of the Columbia group, near Bear Creek, in Dixie district.——The tunnel on the Helen Gould group is in 200 feet, and the shaft is down 80 feet.——On the Hill Top, the tunnel is in 150 feet.

OWYHEE COUNTY.

On Dec. 24th, 1900, the tunnel on the War Eagle, at De Lamar, had reached the 2840-foot mark.

New machinery will go in on the mines at South mountain next spring.

SHOSHONE COUNTY.

During 1900 the mines in the Cœur d'Alene region have produced 1,600,000 tons of crude ore, and they have shipped 180,000 tons of concentrates, the estimated product from which is put at from 90,000 to 100,000 tons of pig lead; the gross value of the output is given at $14,000,000; average value of ore shipped is 25% lead and thirty ounces silver to the ton. Since 1886 the region has produced $100,000,000 worth of silver.

The Bitter Root Mountain M. Co., recently organized, has bought a group of claims, including the United States, America, Virginia, Pittsburg, Tom Boy and Don't Know, on Placer creek.——The Orofino M. Co., operating mines near Pierce, has moved its main office from Spokane, Wash., to Walla Walla, Wash. The company may buy more claims at

Pierce.——The main tunnel in the Ray, in Beaver Creek district, near Delta, is being driven.——Harbin & Tilling are driving a tunnel in the Beaver. It is in 100 feet and it is expected to strike galena at 300 feet.

The Empire State-Idaho M. Co. is pushing work on its new concentrator at Government, near Wardner, to completion.——The Star M. Co. will soon begin driving a 2000-foot tunnel on its group near Mullan.

WASHINGTON COUNTY.

The new smelter at Mineral is in operation; about sixty men are employed in the mines.

MONTANA.

E. D. Braden, late assayer in charge of U. S. Assay Office at Helena, estimates total gold production of the State for 1900 at 246,000 fine ounces, worth $5,126,160, and the silver production at 16,750,000 fine ounces, having a coinage value of $21,607,500.

The actual production of the metals during 1899, according to the report of Mr. Braden to the Director of the Mint, was: Gold, 233,127 fine ounces, worth $4,819,156; silver, 16,850,755 fine ounces, worth, at coinage value, $21,786,834.

MEAGHER COUNTY.

A 200-foot crosscut tunnel is being run on the Silver Belt, at Neihart; a bucket tramway will be put in when tunnel is completed; $50,000 has been spent in development on this property.——The addition to the Diamond R. concentrator is nearly completed; machinery will go in soon; the tramway to the Broadwater is under way.

SILVER BOW COUNTY.

A company is being organized in Butte to work the Emma, near there; it has bonded the mine for $110,000; sinking will soon begin and shaft will be sunk to 800-foot level; property is equipped with a steam hoist capable of sinking to a depth of 1000 feet.——F. A. Heinze has bought the Little Ida, on Horse canyon, near Columbia Gardens.——On Dec. 30, T. McLaughlin, receiver for the Nipper, filed his November report; it shows receipts as $21,563.65 and expenses as $21,989.09, leaving a debit balance of $425.44.

NEVADA.

The estimated yield of the mines of Nevada for 1900 is $3,500,000.

ELKO COUNTY.

During 1900 the mines of the county produced $255,000.

ESMERALDA COUNTY.

It is estimated that there is $10,000 worth of ore in sight at the Wilson at Pine Grove.——In Tonopah leasers are restricted to 200 linear feet on the vein, and they pay a royalty of 25%.

EUREKA COUNTY.

The output of the county mines for the year 1900 is given as $336,000.

The Ruby Hill Tunnel & M. Co., at Eureka, levied an assessment of one cent per share, delinquent on the 28th inst.

During the week ending Dec. 28, 1900, the following shipments of ore were made from the mines at Eureka:

	Pounds.
Bullwhacker	66,740
Eureka Con	147,870
Helen	3,970
Silver Connor	10,220
	228,800

LINCOLN COUNTY.

The mines of the county produced over $1,000,000 worth of ore during 1900.

LYON COUNTY.

A strike of ore running $100 to the ton is reported made near Como.

STOREY COUNTY.

The production of the mines of the county for 1900 is given as $251,000.

WHITE PINE COUNTY.

There are about 100 men working on the Robust, Chainman and Pilot Knob mines, near Ely.

NEW MEXICO.

COLFAX COUNTY.

At the trustee's sale of the Golden Ajax, recently held in Raton, the property was bought by C. C. Forrester for $14,000 for the creditors.

DONA ANA COUNTY.

The pumping machinery at the Torpedo, at Organ, is working satisfactorily; shipments of ore will be started soon.——Work on the Memphis is suspended until June 1st.——Allen & Keen of Cripple Creek, Colo., are working three claims near Organ, and they expect to begin shipping ore next month.——More men will probably be put on at the Excelsior.——The Copper Bar M. & M. Co. has stopped operations for the present, owing to inflow of water; larger pumps will be put in and operations resumed.——The 100-ton concentrator of the New Mexican Lead Co., in San Andreas canyon, at Organ, is nearly completed.

OREGON.

The gold production of Oregon for the year 1900 is estimated to amount to $3,770,000.

BAKER COUNTY.

M. F. Bennett, owner of the Tempest, in the Greenhorns, near Sumpter, reports a strike of $26 ore on the property; the tunnel is in 150 feet; Mr. Bennett contemplates the erection of a smelter on the property next year.—— The drift from end of the 450-foot crosscut tunnel on the Cayuse, in the Greenhorns, is in 60 feet; drifting will be continued through the winter under Supt. E. Hahn.—— The Mammoth mill, near Sumpter, is running again; plant consists of a 5-foot Bryan mill, four 6-foot concentrators, crusher and a 25 H. P. engine; the mill will run on ore from the Belle Baker.—— The Scandia Tunnel Co., running a tunnel through Quebec mountain, reports good progress being made; Manager C. R. Aldrin states that he is preparing to put in power drills and a compressor plant.——The new mill on the Richmond, of the Empire M. Co., is completed.——The tunnel on the Keystone Belle and Gold Bay consolidated claims, in the Bonanza district, is in 700 feet; manager, J. W. Bolland.—— Supt. Williams has eighteen men working on the Littie Giant; the crosscut, now in 1000 feet, is expected to cut the lead at 1020 feet; a 20-stamp mill, vanners and a complete electric light plant are on the ground, but they will not be put up until nature of ore in main ledge is determined by the new tunnel.

The crosscut tunnel on the Connor creek, at Baker City, has reached the vein; the tunnel is over 3000 feet long, and it cuts the ledge 1000 feet below the surface; two shifts are working; the mill has thirty-five 750-pound stamps, and is run by water power.——The Huntington M. Co. will work the Connor creek canyon placers next season.——The tunnel on the Gordon property, at Sumpter, is in 200 feet; ore is said to assay $8 to the ton.

There are 400 stamps at Baker City, distributed as follows: Bonanza 40, Columbia 20, Golconda 20, Connor Creek 35, Union Companion 20, Gold Ridge 10, Robbins-Elkhorn 10, Little Giant 20, Magnolia 10, Mammoth 10, Hines & Helmer 10, Empire 10, Red Boy 20, North Pole 20, Badger 20, Gold Hill 10, Baisley-Elkhorn 20, Flagstaff 10, Ohio 10, May Queen 10, Cougar (100-ton cyanide plant) 30, Bald Mountain 20, Starr & Starter 5, Brazos 10. Additional stamps are going in as follows: Gold Hill 10, Empire 10, Brazos 10, Mammoth 10, Bald Mountain 10, Golconda 10, Columbia 10; total 70.

The controlling interest in the Bison G. M. & M. Co., of Sumpter, is sold to San Francisco men; work on the Bison group, at Quartzburg, will soon begin.——Six giants are operating on the Rye Valley placers, on Dixie creek; each giant produces from $20 to $25 per day.——Supt. Copsey is pushing work on the Crown Point, in Cable Cove camp; steam drills are used; the 500-foot crosscut tunnel is in 200 feet; altitude of the Crown Point is 7970 feet.——The main working tunnel on the Gipsey Queen, in Cable Cove camp, has reached a depth of 70 feet.——The Burnt River G. M. & M. Co., operating near Express, has a 10-stamp mill equipped with 1000-pound stamps, ore crusher, four concentrators, etc., with a crushing capacity of thirty tons of ore per day.——The Keystone mines in the Virtue district will probably be put in shape to run by spring.

JACKSON COUNTY.

A new mill is going up at Gold Hill.——Five additional stamps are going in at the Oregon & Montreal M. Co.'s mill at Ashland.

The 10-stamp mill at the Braden, at Jacksonville, is running steadily.

JOSEPHINE COUNTY.

Two veins of ore—one high grade and the other low grade—are reported opened up on the Greenback, in Grave creek district.——The Gold Standard M. Co., capital $4000, is incorporated at Grant's Pass.

UNION COUNTY.

The old Gem, near Sparta, is reported bonded to Denver men, who will work it on a large scale.

SOUTH DAKOTA.

LAWRENCE COUNTY.

The American M. Co. will resume boring with the diamond drill in Spearfish canyon, near Deadwood. Drifting continues from the bottom of the shaft. The face is 300 feet from the shaft; I. Madill Supt.——S. R. Thompson of Boulder, Colo., is reported to have bought property near Galena, 10 miles east of Deadwood.

The Holy Terror-Keystone Co. is doing development in the Holy Terror mine. Headers are being driven on the 800 and 900-foot levels. Fifteen stamps of the Keystone mill are dropping.

PENNINGTON COUNTY.

A strike of rich ore is reported made on the 185-foot level of the Chilcoot, 8 miles from Keystone.——The Wealthy group, near Keystone, is sold to a Sioux Falls company. A 20-stamp mill and a 100-foot two-compartment shaft are on the property. G. P. Ward represents the buyers.

UTAH.

The mineral output for the State during the year 1900 is given as follows:

	Ounces.	Value.
Gold	206,261	$4,263,414 87
Silver	10,196,818	6,322,027 16
	Pounds.	
Lead	96,088,100	3,843,524 00
Copper	18,354,726	2,973,465 61
Total valuation		$17,402,431 64

[Gold computed at $20.67 per ounce; silver, 62 cents an ounce; lead, $4 per hundred; copper, 16½ cents per pound.]

The following table shows number of pounds ore and bullion from mines of Utah handled by railroads for the years 1899 and 1900:

	1900. Pounds.	1899. Pounds.
Silver-lead ores	206,195,902	89,925,227
Silver-lead bullion	46,159,052	50,017,257
Copper bullion	12,302,407	7,812,875
Copper ores	4,963,940	30,000
Iron ores	140,000	.....
Sulphides	60,000	.....
Total	269,821,301	147,785,359

Increase for 1900, 122,035,942 pounds, or 87.57%.

During 1900 the mines of Utah paid $3,060,400 in dividends, as follows:

	Paid in 1900.
Centennial-Eureka	$317,500
Con. Mercur	110,000
Carissa	35,000
Daly-West	487,500
Dixie	15,000
Gemini	125,000
Golden Gate	420,000
Grand Central	25,000
Grand Gulch	2,400
Horn Silver	20,000
Mammoth	220,000
Mercur	115,000
Ontario	90,000
Rocco-Homestake	4,500
Silver King	1,000,000
Silver Shield	1,500
Swansea	70,000
Utah	2,000
Total	$3,060,400

Total amount of dividends paid by mines of Utah to date is $38,642,750.——The coal production of Utah mines for 1900 is shown in following table:

	Tons.
Pleasant Valley Co	984,399
Weber Coal Co	42,644
Grass Creek Co	32,360
Sanpete county	7,500
Uintah county	6,500
Emery county	8,000
Grand county	1,000
Other small mines	52,500
Total	1,134,903

Of this amount 550,000 tons were exported, the balance being consumed in the State.

BEAVER COUNTY.

Good reports are made regarding the Ben Harrison group, at Frisco.

IRON COUNTY.

The shaft on the Hope group, near Modena, is down 60 feet; a ledge of spar and quartzite 15 feet wide is opened up on this level.——Nolf, McNeill & Dye expect to develop the Old Mack group, on which they recently found a 6-foot ledge of ore, assaying $7 in gold and silver to the ton.

JUAB COUNTY.

A 2-foot vein of lead ore is reported opened up in the drift 100 feet below the tunnel level on the Tiernan, at North Tintic.——A new body of high-grade ore was recently opened up in the upraise from the 525-foot level of the Shoebridge-Bonanza; ore is being taken out for shipment.

The Tesora of Tintic is to have a concentrator; plans are in preparation and contract for construction will be let soon.——The workings on the Swansea are now 1050 feet deep; crosscutting is in progress on this level.

SALT LAKE COUNTY.

The Mingo smelter, at Sandy, belonging to the American Smelt. & Ref. Co., is closed down; the company is putting up a new 1000-ton a day plant, but this is not expected to be completed until August next.

G. B. Sessions reports favorable progress at the Silver Shield, at Bingham; semi-monthly shipments of ore are being made.——At the second annual meeting of the Boston Con. C. & G. M. Co., Ltd., held in London on Dec. 20th, report submitted showed that amount expended upon development of property, which included office and general expenses for year ending Sept. 30th, less amount realized from ore sales, was $48,636. On the company's territory at Bingham during year 2811 feet of tunnels, drifts and crosscuts have been completed. Management states that better results have been obtained from tests made by company's milling department than those obtained by Mr. Edison and others. The erection of a concentrating mill has been postponed.

During the month of December the Highland Boy smelter, at Bingham, turned out 480,000 pounds of copper, gold and silver bullion.

During 1900 the Taylor & Brunton sampler at Salt Lake treated 113,867 tons of ore; the Conklin sampler during the same period treated 53,000 tons of ore; the Pioneer sampler, at Sandy, treated 24,912 tons of ore during the year.

The furnaces of the new Highland Boy smelter, at Bingham, are blown in; all construction work will be finished in two weeks.——The Irish-American is reported bonded to Baltimore men for $50,000; work will be pushed on the property.

The Shawmut Co. at Bingham has contracted with the Telluride Electric Co. for mill power, which is expected to be in by Feb. 1; fifteen men are working on the Shawmut.——The Standish & Jimpson Co. will soon begin hauling ore from the Northern Light to the Dewey mill.——Development is progressing on the Congor, at Bingham; a mill will probably go in next year.——Eleven men, besides several leasers, are working on the Columbia, Bingham; good ore is being taken out.

Work on the Golconda, Salt Lake, will be continued through the winter.——Operations on the Anthony group, at Bingham, will probably resume soon.——Tram connection with No. 7 tunnel at the Highland Boy is made.

A well-defined vein of galena is opened up in upper workings of the York, at Bingham, 200 feet below the surface.

SUMMIT COUNTY.

Sinking is in progress on the Alliance, at Park City; manager, T. Kearns.——J. Rhoden has men working on the Rhine Fraction and Manadock claims of the Crown Point Co., near the Ontario.

The earnings of the Ontario, at Park City, for the year 1900 are given at $662,000.

TOOELE COUNTY.

The West Argent M. Co. of Stockton has levied an assessment of 2 cents per share, delinquent Jan. 23, to clean up indebtedness incurred in the erection of the new concentrator, recently completed; the mill is running; more men are being put on.

About 800 tons of ore are daily being run through the mill at the Con. Mercur, at Mercur.

UTAH COUNTY.

The Giant group, in Dry canyon, Deep Creek district, consisting of four claims, will be worked by W. Babcock and others.

WASHINGTON.

FERRY COUNTY.

The east drift in the Flag Hill is in about 50 feet; values have increased from $10 to $46.45 per ton; a working shaft will probably be sunk to the 200-foot level.——Work on the Trilby, on the San Poil river, 5 miles south of Republic, is resumed; ore from this mine runs about $7 or $8 to the ton.——Supt. E. J. Delbridge, of the California, states that the shaft is down 140 feet; good ore is being taken out; a whim is used for hoisting.——On the Admiral Dewey a crosscut will be run on the 50-foot level.——The drift on the Hercules shows a good body of high-grade ore; average width, 7 feet.—— Good progress is reported in driving the crosscut on the Oversight.

The Republic mill, at Republic, D. C. Jackling, manager, will make monthly cleanups.

Twenty-seven tanks, or 2700 tons, have been cleaned up at the Republic mill, at Republic; the following percentages of savings were obtained from last three tanks cleaned up: 90, 95, 50, 90, which are respectively the highest and lowest savings made to date.

The shaft on the Gray Eagle, now down 100 feet, will be sunk an additional 200 feet before crosscutting is started.——A 500-foot tunnel is run on the Copper Bullion; a winze is being sunk from the floor of the tunnel.——A 70-foot shaft is sunk on the Decimal.

LINCOLN COUNTY.

New machine rock drills are going in on property, near Egypt.

OKANOGAN COUNTY.

Sinking is in progress on the Six Eagles, at Loomis; a 50-ton concentrator will be

put in; concentrates run $150 per ton.——Active work is in progress on the Puritan mines, on Gold Hill; 50 men are working; the company will put in a 50-ton mill.——The Golden Zone is enlarging its capacity from 25 to 75 tons daily.——It is reported that the Utica-Oro Fino will put in a big mill next spring.

SNOHOMISH COUNTY.

The new 3-drill air compressor is in place on the Ethel, near Index; twenty men are working at the mine; the new mill will go in soon, machinery for same being en route; work will be continued through the winter.

STEVENS COUNTY.

The capacity of the Northport smelter is being increased to 1200 tons daily.

Operations on the Copper King, at Chewelah, will resume.——A new 500-foot tunnel will be run on the Wells-Fargo, in Springdale district.——At the Eagle, Chewelah, a new double steam hoist will soon be in place, machinery being on the ground.——The Monarch M. & R. Co. has begun work on the North Star group, near Bossburg. —— Trimble Bros. are working on the Pomeroy, on Sulphide mountain.

WYOMING.

BATTLE LAKE COUNTY.

The Beulah Copper Co. of Boston, Mass., capital $1,000,000, has bonded three copper claims located by J. F. Ledbetter near Grand Encampment.

FOREIGN.

BRITISH COLUMBIA.

The Van Anda group, consisting of twenty-five claims on Texada island, is sold to an English company, $450,000 being paid for 85% of the stock. The transfer will take place in February.——The Slocan Star at Slocan is producing good ore. Fourteen carloads recently shipped returned $1600 to the ton.——On the 800-foot level of the Le Roi, Rossland, the crosscut to the south is in 200 feet.——Good ore is opened up on the 1000-foot level of the War Eagle.

Shipments of ore from the Arlington Basin district during 1900 amounted to 2500 tons.——The main drift on the Bondholder is in 180 feet.

All machinery for the new plant at the Silver King, on Toad mountain, 8 miles from Nelson, is on the ground. Development work will be started on the 900-foot level in about three weeks; the mine is unwatered.——On Observation mountain, near Grand Forks, development work is going forward; a shaft is being sunk and a tunnel run.

The December output of the Sullivan group, East Kootenay, is given at about 1340 tons; a new tunnel to open up No. 3 level will be run; a railway spur from Kimberley to the mines will be built this spring.

ONTARIO.

The annual report of the Bureau of Mines gives the output of the Province for 1899 at $423,978, as against $36,900 in 1892.

Since restarting of the mill at the Mikado, Lake of the Woods district, 1365 tons of ore have been crushed, yielding 256 ounces gold; 1261 tons of tailings treated by cyanide process yielded 318 ounces of bullion; a new incline shaft is being sunk.

THE KLONDIKE.

It is estimated that in 1900 the N. W. Territory (Klondike) district, produced $22,287,566 in gold and silver.

Recently Declared Mining Dividends.

	Payable.
Mary McKinney M. Co., Colorado, 3 cents per share, $30,000	Dec. 24
Empire State-Idaho M. Co., Idaho, 3% on capital stock, $30,000	Dec. 31
Julian M. Co., Alaska, 5%, $5000	Jan. 1
Silver Shield M. Co., Utah, ½ cent per share, $1500	Jan. 1
Union Zinc & Lead Co., Kansas, 1%, $5000	Jan. 2
Bunker Hill & Sullivan M. & Concentrating Co., Idaho, $21,000	Jan. 4
Montana Ore Purchasing Co., Montana, regular $1 per share and extra dividend of $2 per share	Jan. 21
Parrot S. & C. Co., Montana, $1.50 per share, $344,775	Jan. 28

Catalogues Received.

"Electrical Wires and Cables for Telegraph, Telephone, Light and Power Circuits" is the title of a booklet on electrical conductors, with tables, price lists, and rules for safe handling, issued by the American Steel & Wire Co. Copies can be had upon application to any of its sales offices.

Personal.

S. B. MILNER, of Salt Lake, Utah, is in California.

W. F. SNYDER, of Salt Lake, Utah, has gone to New York.

DWIGHT B. HUNTLEY, of De Lamar, Idaho, is in San Francisco.

SUPT. HAZLETON, of the Mingo smelter, Sandy, Utah, is in Pennsylvania.

C. M. FASSETT returns to California from Korea on the next Japan steamer.

J. F. KIDDER, Cal. State Debris Commissioner, has resigned his official position.

GEO. WENDELING is elected Manager Kern River, Cal., Oil Producers' Association.

R. C. CHAMBERS, Supt. Ontario and Daly mines, Park City, Utah, has returned there from California.

A. B. RICHMOND, chief engineer Las Prietas mines, Sonora, Mexico, has resigned and will go to Socorro, N. M.

B. H. TATEM succeeded E. D. Braden as assayer in charge of the U. S. Assay Office, Helena, Mont., on the 1st inst.

A. E. ELLIOTT, of Gloucester, and A. P. Ayling, of Boston, Mass., both of the New England Cop. Co., are in Clifton, Ariz.

L. A. PHILLIPPS, of Pittsburg, Pa., is the new superintendent of the Trade Dollar power plant, at Swan Falls, Idaho, vice W. White.

W. C. KNIGHT AND A. C. LAWSON have been elected president and secretary, respectively, of the Cordilleran section of the Geological Society of America.

PHILIP ARGALL has completed a six years' engagement as manager of the Metallic Extraction Co., of Cyanide, Colorado, and has resumed the practice of consulting engineer at Denver, Colo.

E. G. STOIBER will have general management of the Silver Lake group of mines at Silverton, Colo., which he is credited with having recently sold to the American Smelting & Refining Co. for $2,500,000.

W. B. GILLINGHAM has returned to San Francisco from the Siberian coast, where he is manager for a Russian mining company, operating the only gold quartz mine in Siberia on the island of Askale, 30 miles from Vladivostok. Mr. Gillingham will return March 1, 1901, with additional stamps and machinery.

WILLIAM A. CLARK of Montana says: "I am going ahead with the new road from Salt Lake to Los Angeles. It will cost $17,000,000, and the financial arrangements are all made. Complete surveys to Salt Lake have been made, and we shall begin laying rails from Los Angeles to San Bernardino soon. My contract for the sale of copper through the Lewisohns expires Jan. 31st, and after that I shall use most of it in my own wire works in New Jersey, where we are turning out 3,000,000 pounds of copper wire and rods per month."

Notices of Recent Patents.

Among the patents recently obtained through Dewey, Strong & Co.'s SCIENTIFIC PRESS U. S. and Foreign Patent Agency, the following are worthy of special mention:

HYDROCARBON BURNER.—No. 664,022. Dec. 18, 1900. G. H. Larkin, San Francisco, Cal. This invention relates to burners for hydrocarbon oils and like material. The object is to discharge the jet of oil mingled with air or steam and to prevent the liquid from dropping into the lower part of the tube, so that it will not be properly vaporized. It consists of peculiarly curved wires held centrally within the burner tube or casing and extending into the discharge passage, peripheral wire extensions upon the interior of the discharge tube, an oil inlet feeding centrally into the burner and upon the first-named wires, and means for regulating the oil supply and the blast. The outer ends of the wires are curved and converged towards the center, and the oil traveling along these wires is continually brought in toward the center, the wires acting as ducts to lead it back so that the blast will vaporize and drive it into the furnace in proper condition for combustion.

QUARTER FOR LOW SHOES.—No. 33,806. Dec. 25, 1900. W. W. Glanville, San Francisco, Cal. The leading or material feature of this invention consists of two sides which constitute the quarter formed in a single piece, having the lower edges made approximately straight. A central V-shaped notch extends upwardly a short distance from the adjacent ends of the straight portions, and the upper edge of the quarter is approximately straight for the greater portion of its length, thence curving upwardly toward each end. From its ends the upper edges curve downwardly and outwardly and meet the outer ends of the straight edges in an essentially reverse curve. The design is especially applicable to low shoes of the class known as "Oxfords."

BUTTER BOX.—No. 664,549. Dec. 25, 1900. J. K. C. Hobbs, San Francisco, Cal. This invention relates to an improved construction of boxes which are especially designed for the transportation of butter. It consists of a box, a cover therefor having a rim around its periphery and projecting downwardly, said rim and the upper edge of the box being formed with a rib-and-groove joint. Hinge plates are secured to the top of the cover and are bent downwardly over said rim and other hinge plates on the box are loosely connected with the first named plates in the plane of the outer sides of the box. Said box has a longitudinal groove in its front and a vertical groove or slot leads therefrom. The cover has a strap depending from its front edge and bent inwardly and adapted to enter the slot so that its bent end rests upon the bottom of the longitudinal groove. A bolt is slidable in the latter groove and is adapted to engage said bent end and lock the cover, and there is a means for retaining the bolt in its groove.

List of U. S. Patents for Pacific Coast Inventors.

REPORTED BY DEWEY, STRONG & CO., PIONEER PATENT SOLICITORS FOR PACIFIC COAST.

FOR THE WREK ENDING DEC. 25, 1900.

664,452.—SAW CLAMP—J. A. Almquist, S. F.
664,372.—FURNACE—P. H. Bagley, Alameda, Cal.
664,718.—VIOLIN SUPPORT — C. W. Brewster, El Monte, Cal.
664,460.—TURNTABLE — E. Burr, Reno, Nev.
664,538.—AGING WINES—A. B. C. Dowdell, St. Helena, Cal.
664,539.—FOLDING BED — D. Eisner, S. F.
664,735.—MATCH BOX — Lizzie C. Fay, Pasadena, Cal.
664,397.—SHOVEL—F. W. French, Bostonia, Cal.
664,740. — RAILWAY BED—J. W. Gray, Sodaville, Cal.
664,634.—WRENCH — Grantstrom & McDonald, McMinnville, Or.
664,638.—SPRING SEAT — S. C. Hitchcock, Tacoma, Wash.
664,549.—BUTTER BOX—J. K. C. Hobbs, S. F.
664,489.—STOVE—J. McCartney, S. F.
664,490.—BICYCLE SURPORT—A. McCollum, San Jose, Cal.
664,665.—PRINTING FRAME — S. McLaughlin, Los Angeles, Cal.
664,499.—FROG—C. E. Perry, S. F.
664,502.—TRIPOD—P. H. Reardon, S. F.
664,434.—CORNET—F. Y. Richmand, S. F.
664,686.—HARROW — M. Smith, Asotin, Wash.
664,794.—PREVENTING COWS FROM KICKING—J. F. Wallace, Ashland, Or.
33,806.—DESIGN—W. W. Glanville, S. F.
33,770.—DESIGN—F. D. Jones, Los Angeles, Cal.

Commercial Paragraphs.

THE Braeburn Steel Co. of Braeburn, Pa., are represented in Denver, Colo., by J. W. Copeland.

The Western Chemical Co., Denver, Colo., within the year 1900, made an increase of one-third in the capacity of their works.

GEO. E. TRUAX has sold the business of the Truax Mfg. Co. of San Francisco to the Globe Iron Works, Stockton, Cal., who will in future manufacture the cars.

In the eighth circuit, U. S. Circuit Court of Appeals, in the case of The Metallic Extraction Co., appellant, vs. Horace F. Brown, appellee, the decision of the court in full is received, affirming the judgment of the Circuit Court of the U. S. for the district of Colorado.

The Atlas Pipe Wrench Co., Flood Building, San Francisco, and 121 Liberty street, New York, report that the Atlas pipe wrench is now in use by both the American and British navies. The makers refer to this "as being another proof that merit tells, as the Atlas tool was practically unknown a year ago."

THE Byron Jackson Machine Works will occupy the premises No. 411 Market street, San Francisco, Cal., this month, as down town offices and salesroom for the works at the corner of Sixth and Bluxome streets. A complete line of steam and gas engines, boilers, centrifugal pumps, geared displacement pumps, etc., will be carried. They will also be prepared to install hydraulic plants per specifications.

Latest Market Reports.

SAN FRANCISCO, Jan. 3, 1901.

SILVER—Per oz., Troy: London, 29⅝d (standard ounce, 925 fine); New York, bar silver, 64c (1000 fine); San Francisco, 64c; Mexican dollars, 50¾c.

The quarterly estimate of the value of foreign coins made by the director of the Mint shows that the value of silver has increased during the last three months .24%. This increase is accounted for by the abnormal demand for Mexican silver in China.

The heavy exportation of silver from Mexico has caused great alarm. Silver has been going through El Paso to China and Japan at the rate of $50,000 a day for five months and the country has been practically drained of silver. The banks have petitioned the Federal Government to stop the movement. The Government may place an export duty on silver. The banks have plenty of money, but it is all in gold not available except as collateral.

COPPER.—New York: Lake, 1 to 3 casks, $17.25 cash; carload lots, 17.00; Electrolytic, 1 to 3 casks, 16.87½; carload lots, 16.62½; Casting, 1 to 3 casks, 16.75; carload lots, 16.50. San Francisco: 18. Mill copper plates, 20c; bars, 22@23c.

New York exports of copper for December were 10,771 tons, making a total for the year 1900 of 151,988 tons.

LEAD.—New York, $4.37½; Salt Lake City, $4.00; St. Louis, $4.20; Missouri lead, $4.32½ desilverized lead; San Francisco $5.00, carload lots; 5½c 1000 to 4000 lbs.; pipe 6¾, sheet 7½, bar 6c; pig, $4.70 @5.10. London, £16 5s per ton.

SPELTER. — New York, $4.20; St. Louis, $3.95; San Francisco, ton lots, 5c; 100-lb lots, 6c.

ANTIMONY.—New York, Cookson's, 10c; Hallett's, 9½c; San Francisco, 1000-lb lots, 12c; 300 to 500 lbs., 13@14c; 100-lb lots, 15@18c.

IRON.—Pittsburg, Bessemer pig, $13.50; gray forge, $13.75; San Francisco, bar, per lb., 2.65c in small quantities.

STEEL.—Bessemer billets, Pittsburg, $19.75; open hearth billets, $21.00; San Francisco, bar, 7c to 12c per lb.

TIN.—New York, pig, $27.00; San Francisco, ton lots, 29c; 1000 lbs., 29½c; 500 lbs., 29¾c; less, 30c; bar tin, ℔ lb, 35c.

QUICKSILVER. — New York, $51.00; large lots: London, £9 2s 6d; San Francisco, local, $48.00 ℔ flask of 76½ lbs.; Export, $45.

For the first eleven months of 1900 Great Britain imported 895,488 pounds and exported 1,825,982 pounds. The corresponding figures for 1899 were 3,877,184 and 2,187,402. Report of California quicksilver exports will be found on page 8.

NICKEL.—New York, 50@60c ℔ lb.

MAGNESIUM.—New York, $3.00 ℔ lb.; San Francisco, $4.00.

ZINC.—San Francisco, 5½c; slab, 5¾c; bar, 7c.

BABBITT METAL.— San Francisco, No. 1, 10c.

SOLDER. — Half-and-half, 100-lb. lots, 18½c; San Francisco, Plumbers', 100-lb. lots, 15½c.

ASSAY LITHARGE.—San Francisco, 10c ℔ lb, small lots.

ALUMINUM.—New York, No. 1, 99% pure ingots, 35c; No. 2, 90%, 30c to 35c.

FERRO-MANGANESE. — Pittsburg, 80%, domestic, $85, large lots.

PHOSPHORUS. — F. o. b. New York 50@60c ℔ lb.

TUNGSTEN.—New York, ℔ lb., 95c; San Francisco, $1.15.

FERRO-TUNGSTEN. — New York, 37%, 35c; San Francisco, 65c (60%).

POWDER.—F. o. b. San Francisco: No. 1. 70% nitro-glycerine, per lb., in carload lots, 15½c; less than one ton, 17½c. No. 1*, 60%, carload lots, 13½c; less than one ton, 15½c. No. 1** 50%, carload lots, 11½c; less than one ton, 13½c. No. 2, 40%, carload lots, 10c; less than one ton, 12c. No. 2* 35%, carload lots, 9½c; less than one ton, 11½c. No. 2** 30% carload lots, 9c; less than one ton, 11c. Black blasting powder in carload lots, minimum car 728 kegs, $1.50 per keg; less car lots, $2 per keg.

CAPS.—3x, $5.50 per 1000; 4x, $6.50; 5x, $8; Lion, $9, in lots not less than 1000.

FUSE.—Triple tape, $3.60 per 1000 feet; double tape, $3.00; single tape, $2.65; Hemp, $2.10; Cement No. 2, $3.00; Cement No. 1, $2.65, in lots of 3000 feet and up.

CANDLES.—Granite 6s, 16 oz., 40s., 11½c ℔ set; 14 oz., 40s., 10c.

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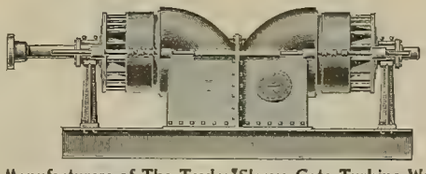

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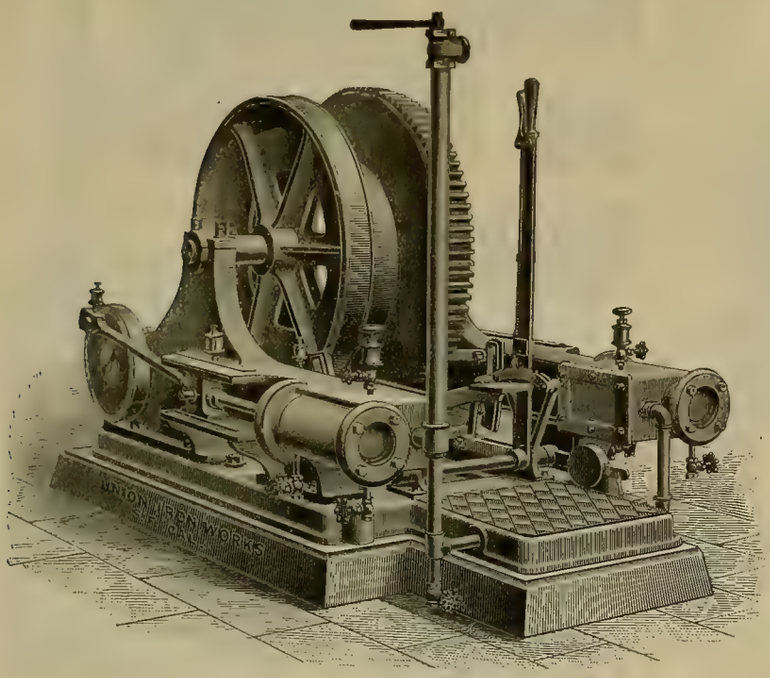

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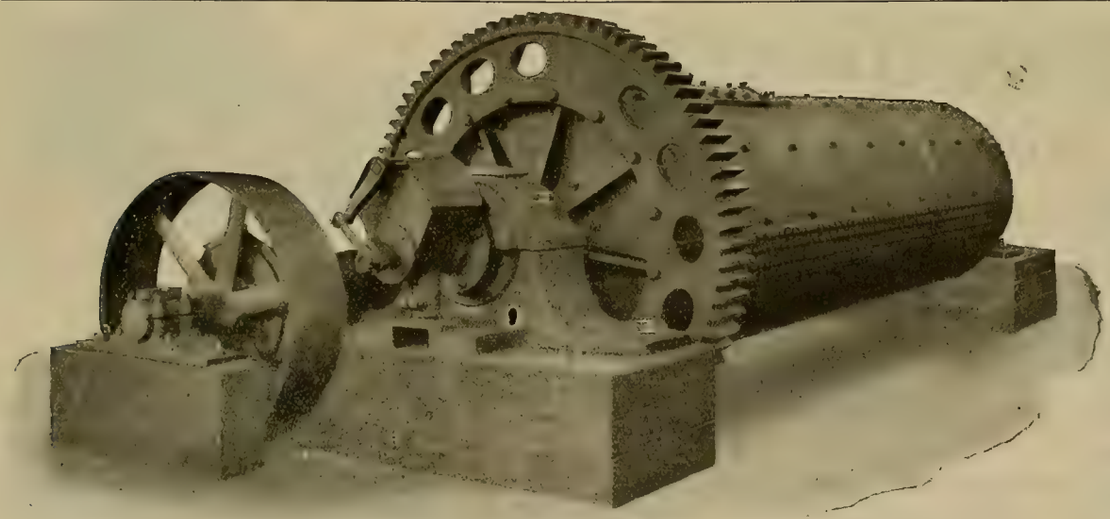

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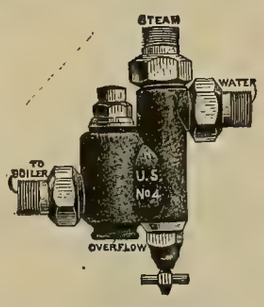

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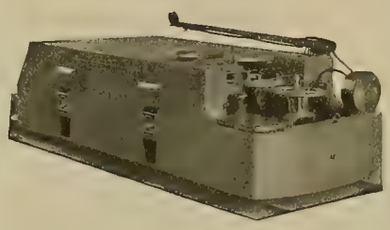

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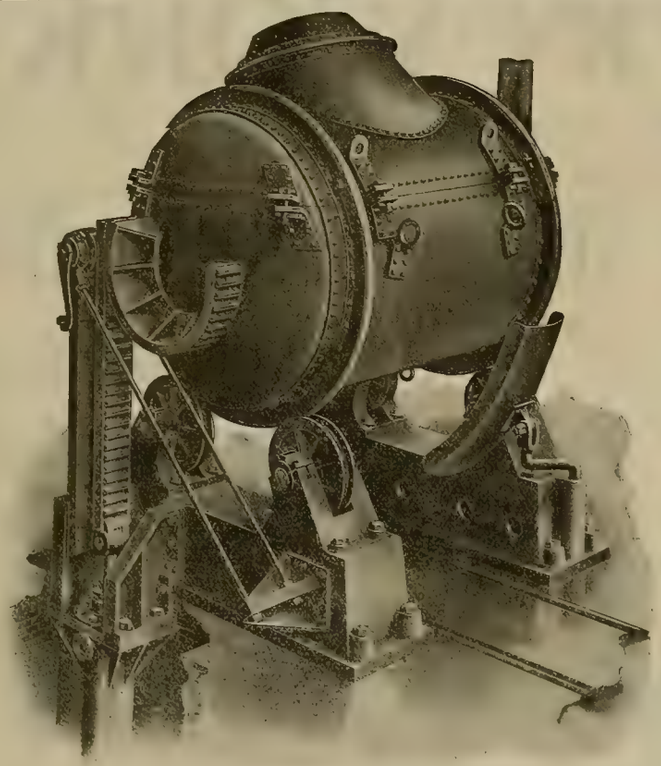

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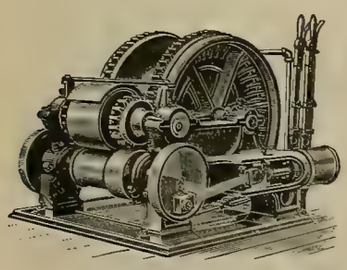

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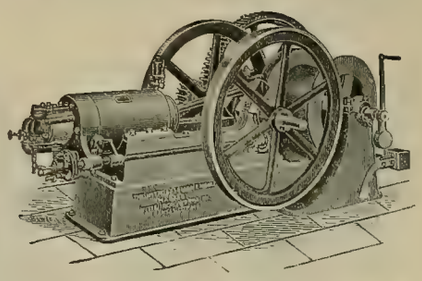

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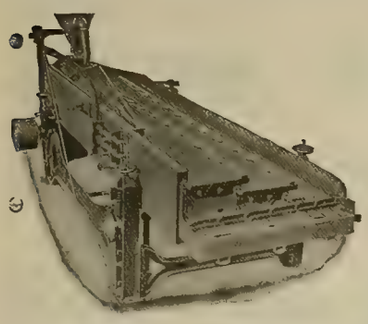

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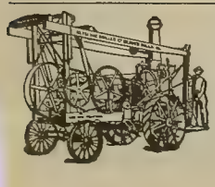

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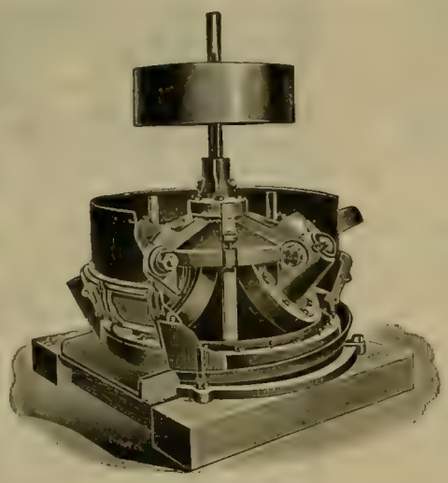

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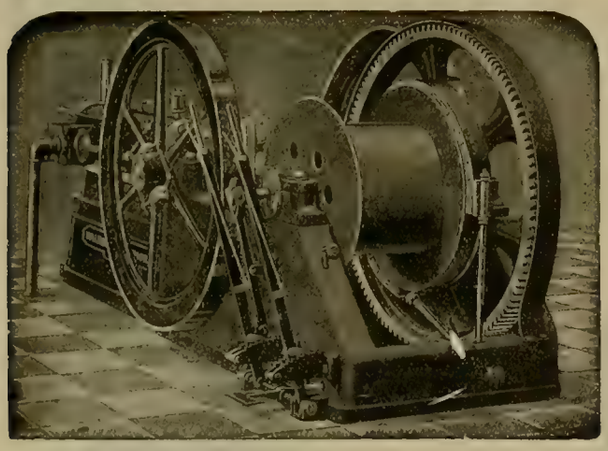

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Perfect Grip Clip,
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Operated by One Man,
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SOLUTION "
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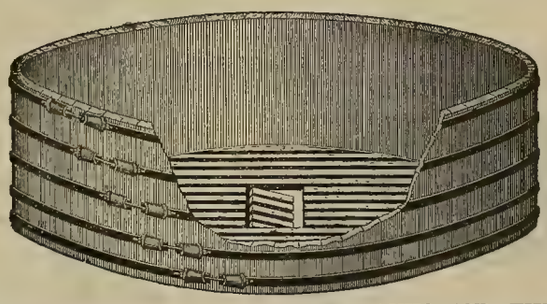
EXTRACTION BOXES.



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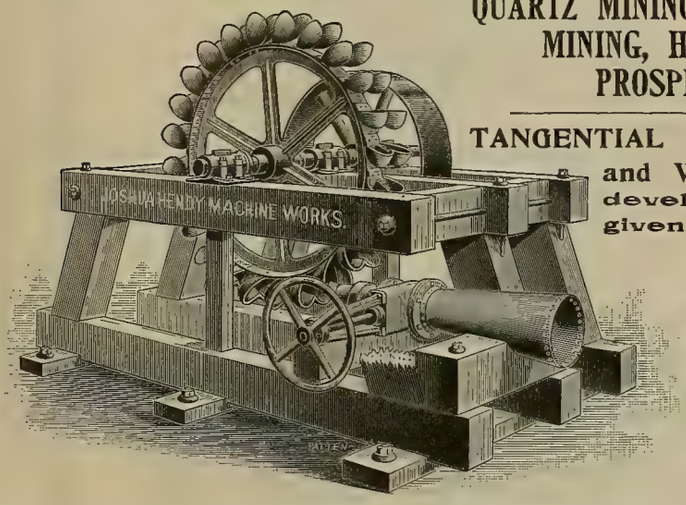

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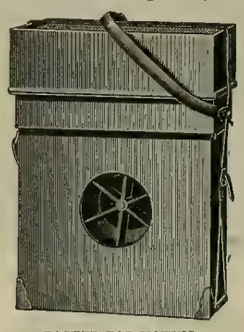
THE PNEUMATIC PROSPECTOR.
Size 6x11x14 in. Weight only 10 lbs.



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NO WATER NEEDED.

Gives a clean prospect from placer ground or free-milling ore by compressed air. The operation is purely mechanical. No chemicals, no quicksilver; no black sand remains with the gold. Will do work equal to careful panning.

THE PNEUMATIC SEPARATOR.
Weight 160 lbs.

Has a capacity of 20 to 30 cu. yds. of gravel per day. Will save fine and coarse gold and nuggets of any size, comparatively free from black sand. Will do better work under favorable circumstances than a sluice box. Indispensable for dry countries

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IN COMPETITION WITH THE ENTIRE WORLD
THE ONLY
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GIVEN AT THE
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FOR EXHIBITS OF
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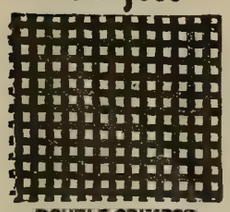

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USE "THE PERFECT"
Double Crimped Mining Cloth,
MANUFACTURED BY
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IMPROVED GOLD DREDGES.

SINGLE LIFT, CONTINUOUS BUCKET TYPE WITH

Working Capacity from 1500 to 5000 cubic yards per day.

IMPROVED GOLD SAVING DEVICE
of highest efficiency.

DREDGES CONSTRUCTED COMPLETE UNDER GUARANTEE OF TRIAL RUN.

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To MINERS and MILLMEN.

If your ores are refractory; if you are losing concentratable values in your tailings; if your mines are in an arid district, or so situated as to make the introduction of water ruinously expensive; if you have large bodies of concentratable ores which could not be profitably treated hitherto,

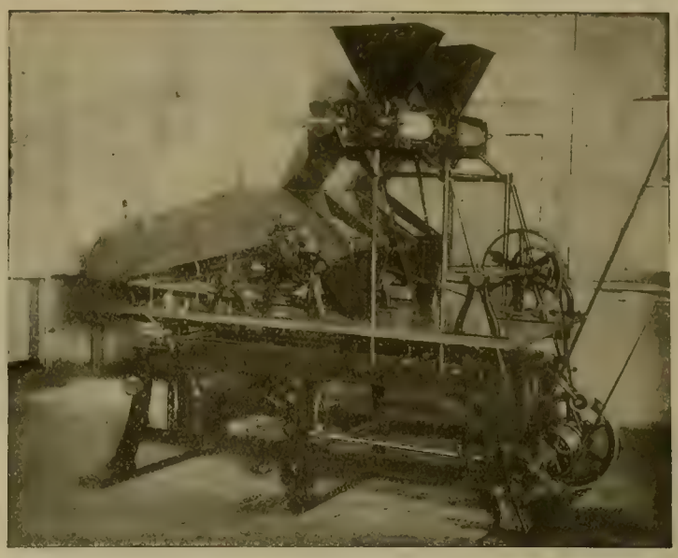
THEN READ WHAT FOLLOWS:

The CROWN GOLD MILLING COMPANY'S concentrating machinery will concentrate any ores, sands or earths carrying metallic particles or metallic combinations of concentratable dimensions.

A shipping product of unexcelled purity is given, the greatest amount of concentratable values extracted, and a greater tonnage of ore is put into a ton of concentrates than by any other system of mechanical treatment. Every pound of ore delivered to machines is accounted for in the ore and concentrate bins.

It will cost you nothing to investigate, and may mean an increased profit on your ores, or a profit on bodies of ores which heretofore have failed to pay more than cost of treatment; or you may be enabled to make a productive property of a mine now idle.

We have a twenty-ton capacity plant in operation. All are invited to call and test it: from 1000 to 2000 pounds ore will be treated as a test. Charge $20, to cover cost assays. Results at mine guaranteed to equal results obtained in testing. Wear and tear and labor cost guaranteed not to exceed cost by wet treatment of same character of ores.



Our machines are not for sale: they are placed on lease or royalty charge as may be agreed upon, and if results are not obtained as guaranteed no one loses but ourselves. Practice is better than theory: direct evidence is better than hearsay. All we ask of you is to come and be convinced that we have claimed less than we accomplish.

Office,.....230 Post St.
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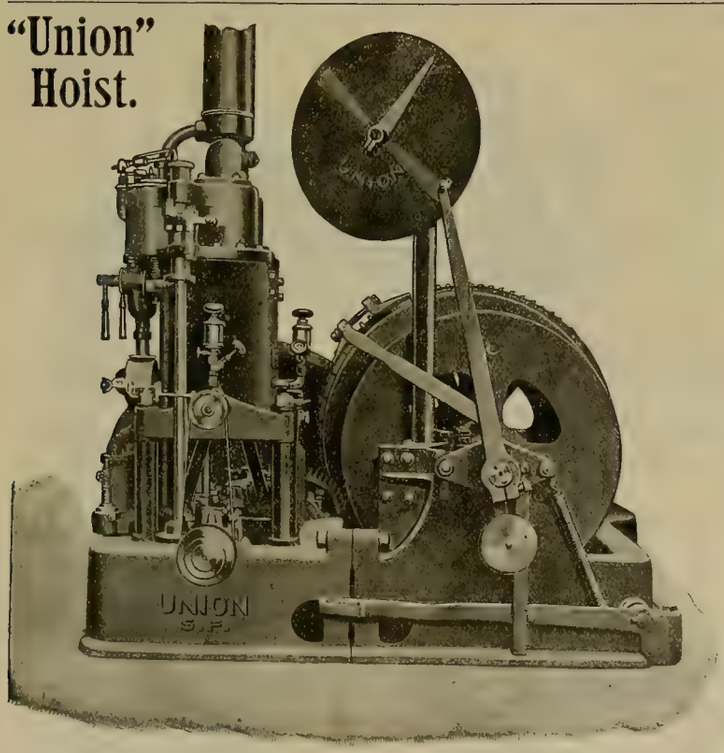
SAN FRANCISCO, CAL.

"Union" Hoist.



The above illustrates the 25 H. P. double cylinder, single drum "Union" hoist, with all the latest improvements.

THE UNION GAS ENGINE CO.

—BUILD THE—

"Union" Gas Engines,

Which use either MANUFACTURED or NATURAL GAS, ORDINARY STOVE GASOLINE (NAPHTHA or BENZINE), DISTILLATE or KEROSENE.

STATIONARY ENGINES for All Kinds of Work in Sizes from 3 to 300 h. p in actual use.
"UNION" COMBINED HOISTS in Sizes from 2 to 130 h. p. in actual use.
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HOISTS and COMPRESSORS Can Be Built in Larger Sizes to Order.
"UNION" MARINE ENGINES, 4 to 300 h. p., of Single, Double and Four-Cylinder Types.
FIFTEEN YEARS' EXPERIENCE Building Gas and Oil Engines.
"UNION" ENGINES Are In Use All Over the United States.
"UNION" ENGINES Are Simple, Durable and Economical.

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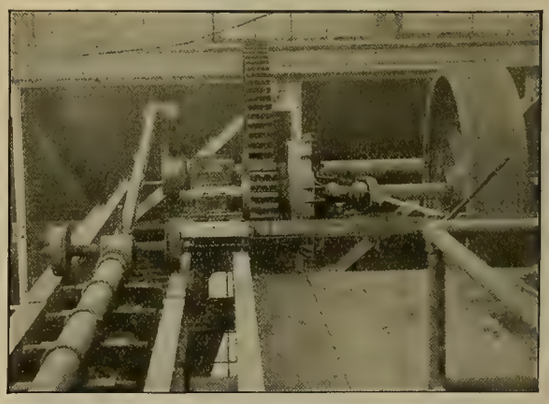
RECIPROCATING CONVEYORS

FOR TRANSPORTING QUARTZ, TAILINGS, SAND, ETC.



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PERFECT DISCHARGE ELEVATORS.

Complete Installations.

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ADAMANTINE SHOES AND DIES.

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CANDA Improved Self-Locking CAMS.

TAPPETS, BOSSES, ROLL SHELLS AND CRUSHER PLATES.

These castings are extensively used in all the mining States and Territories of North and South America. Guaranteed to prove better and cheaper than any others. Orders solicited subject to the above conditions. When ordering, send sketch with exact dimensions. Send for Illustrated Circular.

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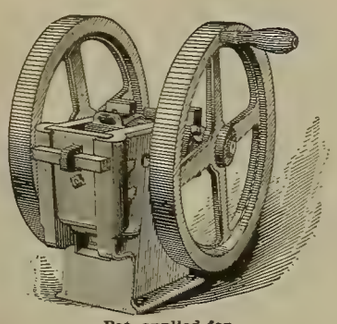
Time, Labor and Money Saved for Assayers.

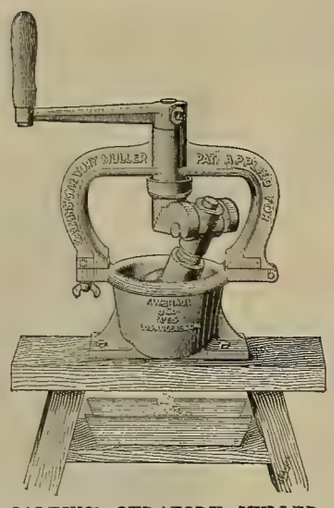


Pat. applied for.

THE SIMPLEX ORE CRUSHER.

For crushing and pulverizing small quantities of ore by either hand or power. It is more easily operated than any other machine of its capacity on the market.

Its features are ease of opening for cleaning and simplicity of adjustment.



CALKINS' GYRATORY MULLER.

A recent invention for reducing crushed ore samples to a pulp. Will quickly pulverize to 100 mesh or finer.

Supersedes the slow and laborious Bucking Plate.

CALKINS' RADIAL BUCKING PLATE.

Designed to replace the old method of pulverizing crushed ore samples to a pulp of any desired fineness with but a fraction of the energy required to operate the old style Bucking Board and Muller.

WRITE FOR OUR NEW DESCRIPTIVE PAMPHLET IN WHICH : ALL OUR NEW SPECIALTIES ARE FULLY DESCRIBED. :

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THE FULTON VARIABLE MOTION CONTINUOUS FLOW MINING PUMP.

Delivers a continuous stream with absolutely no water hammer so common with all other makes of pumps. Is particularly adapted to be driven by electric power, for the reason the resistance to motive power is almost uniform. I manufacture the FULTON PUMP in four sizes, ranging from 10 H. P. work to 50 H. P. work.

WRITE ME FULL PARTICULARS IN REGARD TO YOUR REQUIREMENTS.

The above cut is made from a photograph taken of a No. 3 FULTON PUMP at work on the 600 ft. level in the Tesla Mine at Tesla, Alameda Co., Cal.

Read what MR. O. NEWHOUSE, Consulting Engineer of the S. F. & S. J. Coal Co., has to say in regard to it.

OFFICE S. F. & S. J. COAL CO., TESLA, ALAMEDA CO., CAL., July 13, 1900.

Mr. A. T. Ames, Galt, Cal.—DEAR SIR: Replying to your favor of recent date, regarding the working of the Fulton Pump bought of you, will say: The pump is one of your No. 3 pumps, working in connection with a Fulton Double X, double plunger cylinder 5 in diameter by 110 in. long, stroke of each plunger 2 ft. This pump is installed in our mine on the 600 ft. level, directly over our sump, and is forcing the water to the surface at one lift. We drive the pump with an electric motor, 30 H. P., direct connected to the pump with gear and pinion, and I am pleased to submit the following statement of duty:

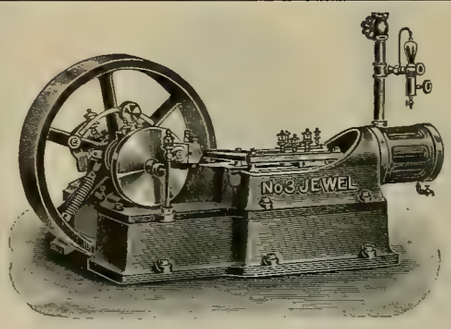
Length of 6 in. column leading up incline to surface	805 ft.	Strokes double per minute, 2 ft	25
Perpendicular head	640.88	Discharge, measured by box center thereof, under 5 in. head, equal to 1½ cu. ft., equal to gallons per hour	4725
Gauge pressure, actual	275 lbs.	Diameter of pump cylinder	5 in.
" " theoretical	278.14 "	Net area of pump cylinder after deducting area of piston	17.868 sq. in.
Barometer at pump	29.58 in.	Efficiency of pump when working under above conditions	84.80 per ct.
" point of discharge	28.95 "		
Temperature air	58 deg.		
" water	76 "		

To say that we are highly pleased with our pump expresses it very mildly.

Signed, O. NEWHOUSE, Consulting Engineer S. F. & S. J. Coal Co.

Manufactured and Sold by A. T. AMES, Galt, Cal.

JEWEL ENGINES



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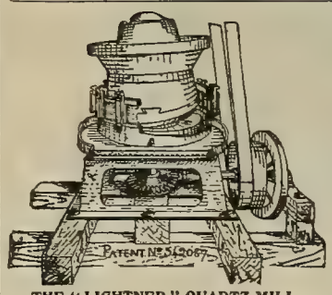
SAN FRANCISCO, SACRAMENTO, LOS ANGELES.



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W. H. Birch & Co.

No. 127 to 135 First St., San Francisco, Cal.

— BUILDERS OF —

LIGHTNER QUARTZ MILLS.

No. 1	works	3	tons per day	with	1½	H. P.
No. 2	"	4 to 7	" "	"	2½	"
No. 3	"	10 to 15	" "	"	3½	"

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"Birch" Two-Stamp Mills, McGlew Concentrators, And All Kinds of Mining Machinery.

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Where, with Enlarged and Increased Facilities, they are better than ever prepared to do

First-Class Machine Work

Promptly, and at Reasonable Prices, and will continue the manufacture of

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Also Marine Engines, Ship and Steamboat Work, Pipe Cutting, General Jobbing and Repairing.

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Buyers of Gold, Silver, Lead and Copper Ores, Gold Concentrates, Lead Bullion, Cyanide Product, Etc.

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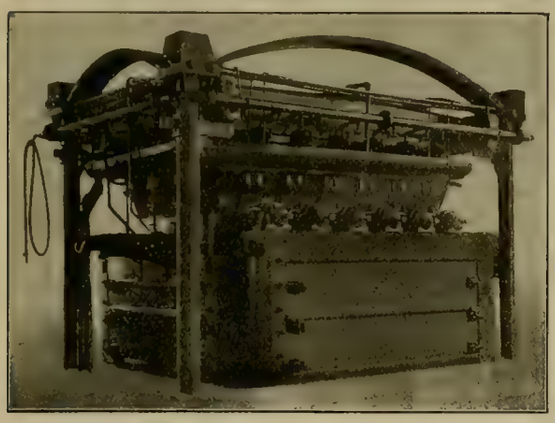
THE COLORADO IRON WORKS COMPANY,



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Smelting Furnaces and Equipments.

The illustration in this advertisement shows one form of our COPPER MATTING FURNACE, employing hot blast; the air being first treated in proper appliance, is conducted through the cast iron bustle pipes placed along the inside of the caisson plates, through the cast iron adjustable tuyeres. This furnace can also be used for silver as well as copper smelting, by changing lining in crucibles. We build them in any size required.

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The furnace is equipped with our special cast iron jackets, and our patented system of water-jacketed mantles.

Send for our catalogue, showing many different styles of smelters for the treatment of

GOLD, SILVER, LEAD, COPPER AND NICKEL ORES,

also the latest and best method for the economical use of jacket water (a saving of 80% to 90% guaranteed) by our patented

WATER VAPORIZING ATTACHMENT.

We design, manufacture and erect Mills for Concentration and Amalgamation, Milling, Chlorination and Cyanide Processes. In writing for information, give us the analysis or character of the ore to be treated, to enable us to intelligently arrive at the proper method.

Our very complete catalogue of CRUSHING MACHINERY will be sent on application.

THE COLORADO IRON WORKS COMPANY,

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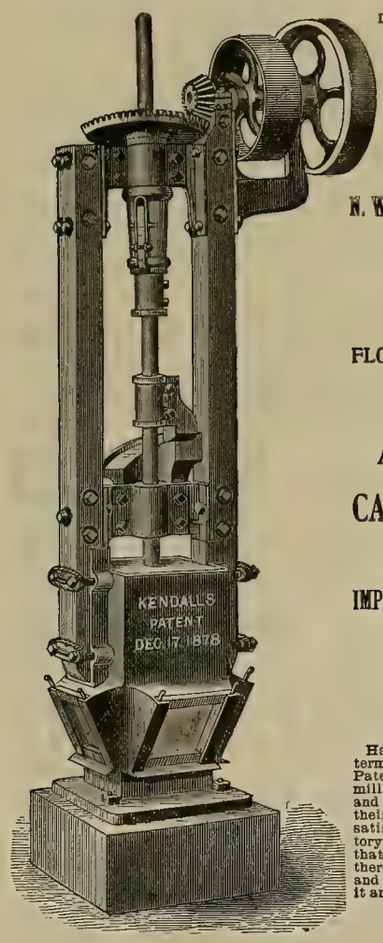

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STATIONARY AND COMPOUND

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OF EVERY DESCRIPTION.

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IMPROVED PORTABLE HOISTING ENGINES

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For keeping your iron and wood work in perfect condition. Nothing else "just as good." Circulars cheerfully furnished.

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Hydraulic, Irrigation and Power Plants, Well Pipe, Etc., all sizes.

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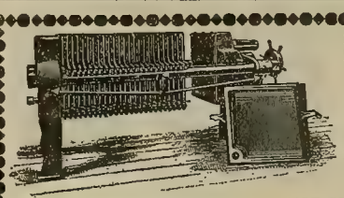
Iron cut, punched and formed, for making pipe on ground where required. All kinds of Tools supplied for making Pipe. Estimates given when required. Are prepared for coating all sizes of Pipes with Asphaltum.



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And Other Aquarious Chemical Solutions.

Our FILTER PRESS

Removes all Slimes and Hastens the Deposition of the Metals.

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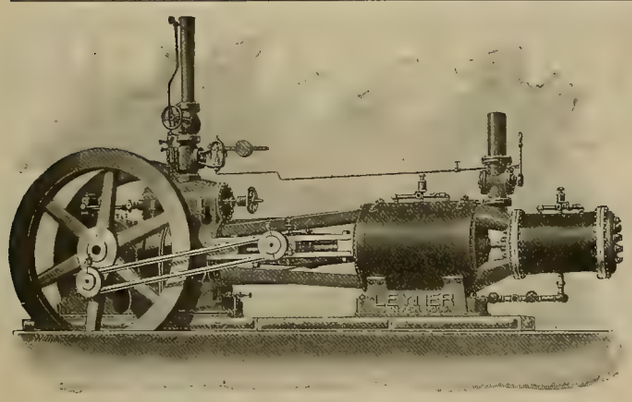

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TAKE A LOOK AT IT==

THEN LOOK again! It will bear inspection. Designed for strength and endurance as well as efficiency. Provided with adjustable steam cut-off and automatic governor. Fitted with relief valve. Extra large bearings throughout. Our own improved (patented) inlet valves. Perfectly balanced steam valve. Both cylinders water-jacketed. Perfect inter-cooler.

WHY NOT HAVE THE BEST? It Pays.

Complete specifications would interest you, and we know you would be interested also in the booklet which describes our

NEW LEYNER DRILL.

BULLOCK DIAMOND DRILLS

If you are interested in prospecting send for our new Diamond Drill Catalogue (No. 33).

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Works in Any Rock, in Any Position.

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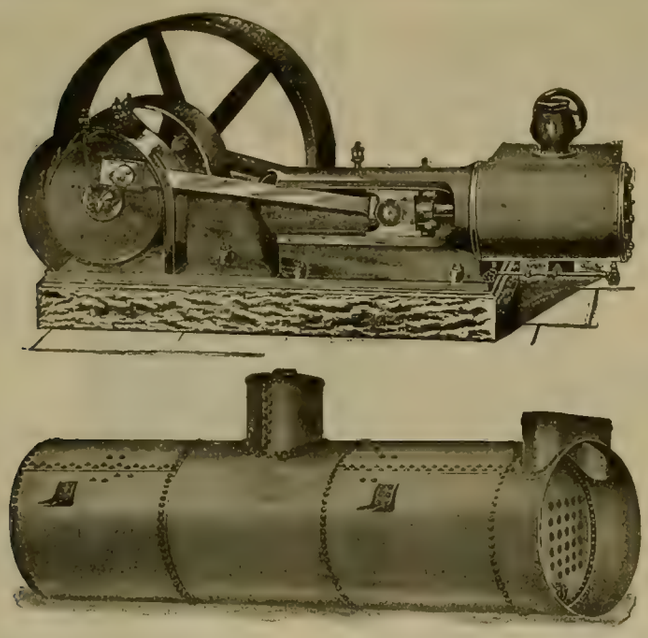

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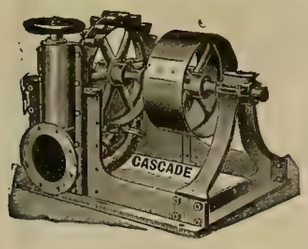

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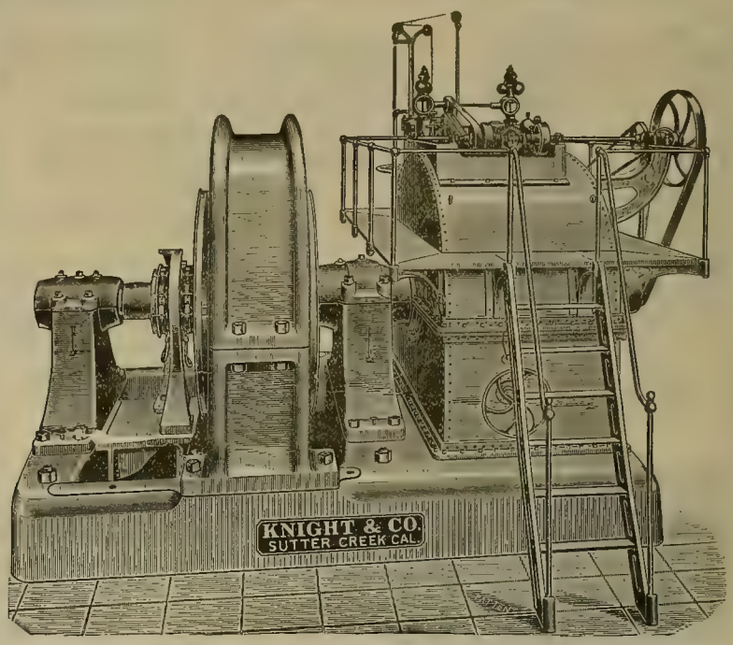

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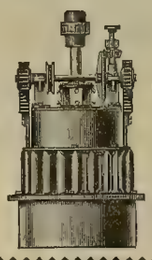

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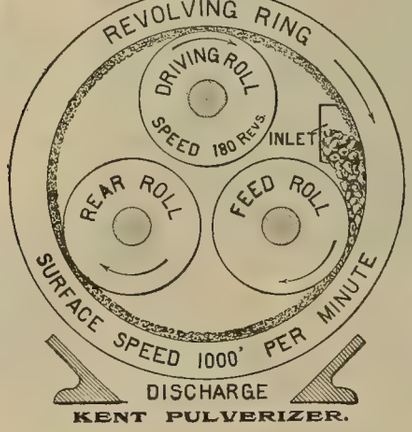

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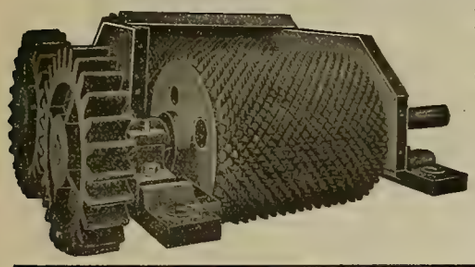

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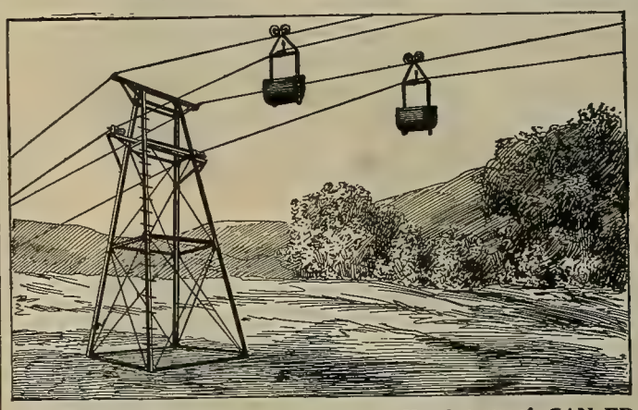

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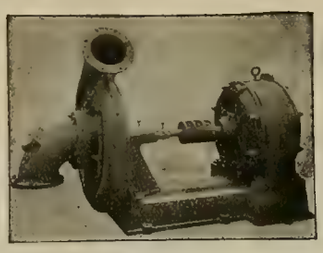

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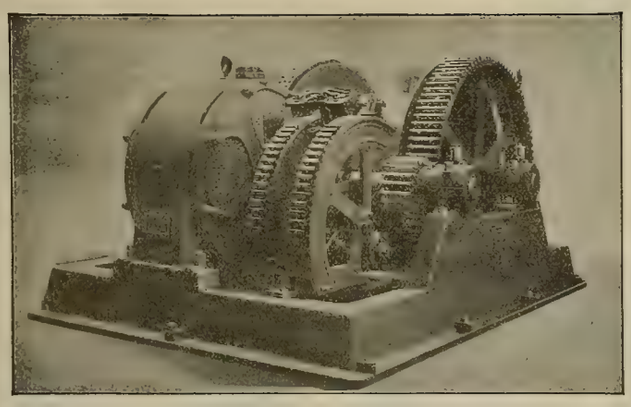

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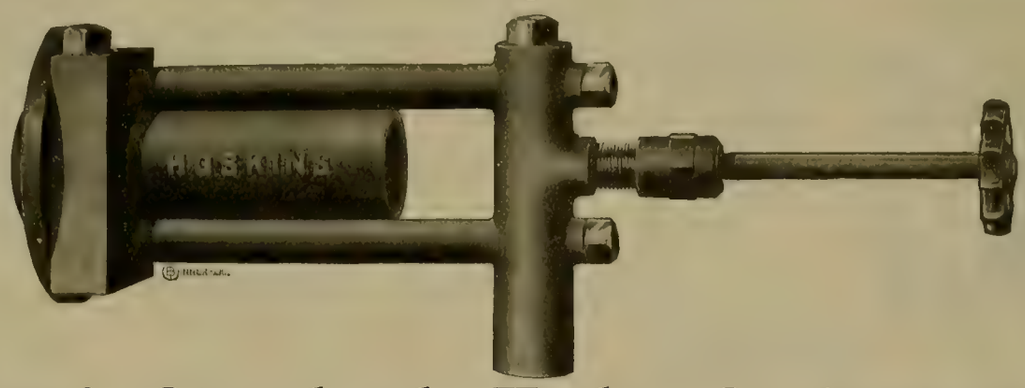

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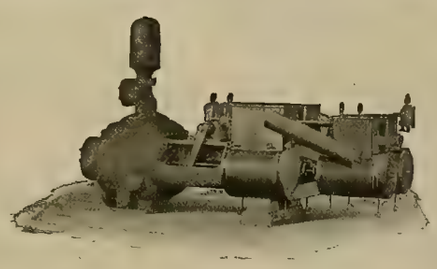

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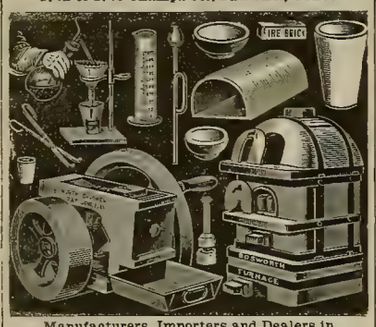

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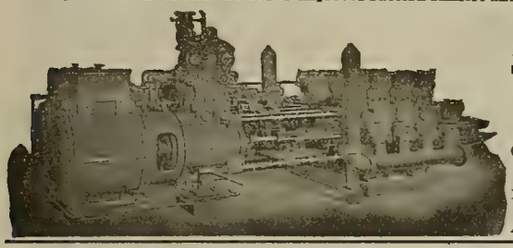

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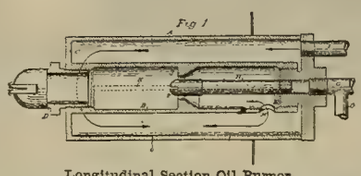

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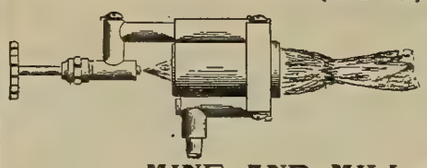

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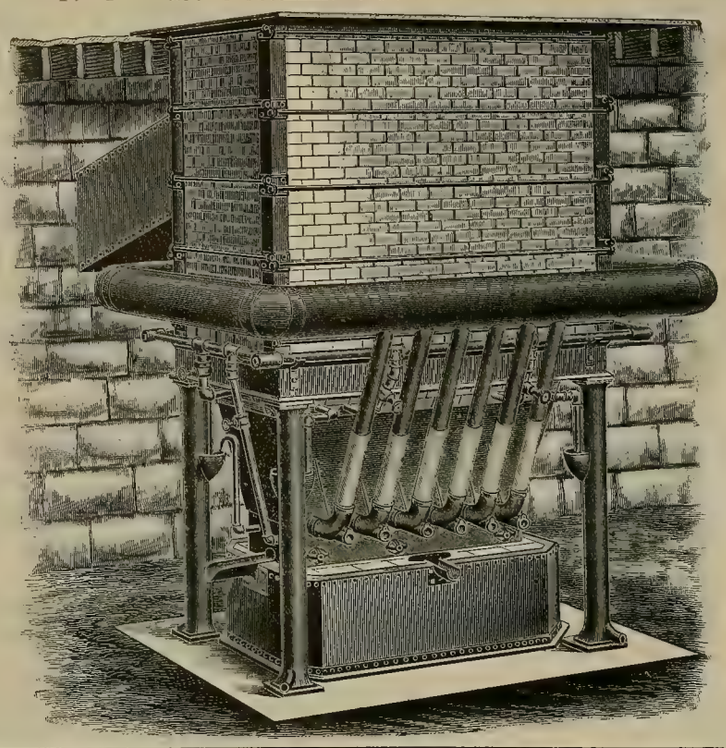

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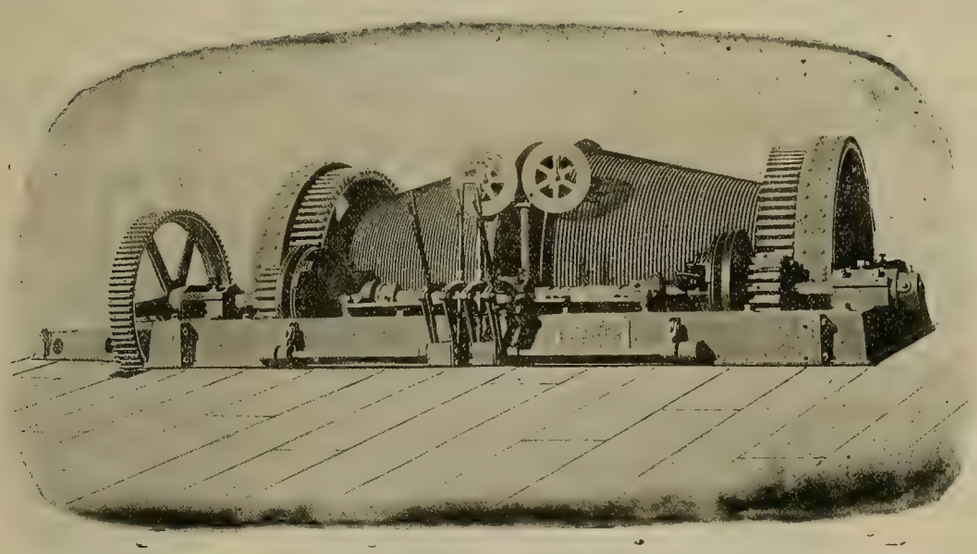

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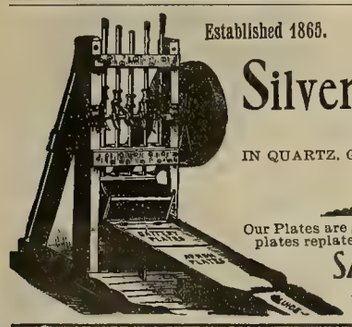

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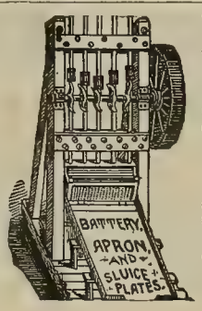

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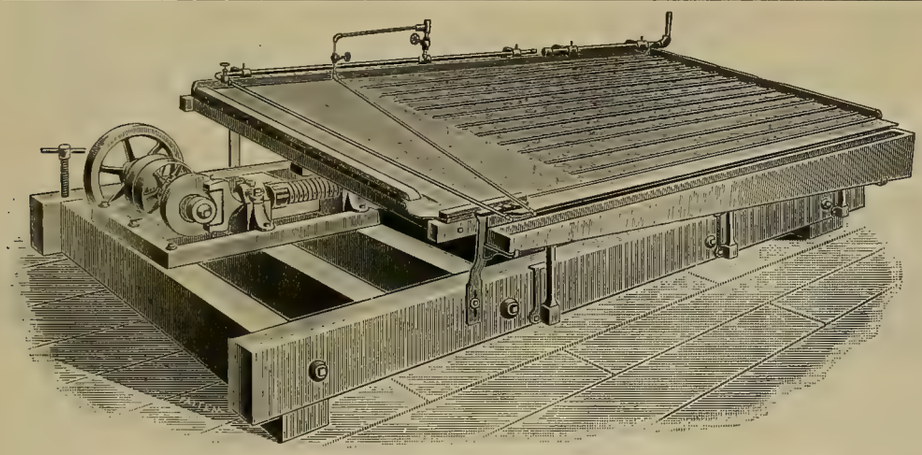

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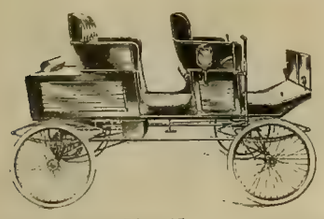

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Annual Meeting.

The Regular Annual Meeting of the Stockholders of the CONS. ST. GOTHARD GOLD MINING COMPANY will be held at the office of the Company, 113-114 Crocker Building, San Francisco, California, on THURSDAY, the 10th day of January, 1901, at the hour of 2 o'clock P. M., for the purpose of electing a Board of Directors to serve for the ensuing year, and the transaction of such other business as may come before the Meeting.

Transfer Books will close on MONDAY, December 31, 1900, at 3 o'clock P. M.

B. N. SHOECRAFT, Secretary.

Office—113-114 Crocker Building, San Francisco, California.

Annual Meeting.

The Regular Annual Meeting of the Stockholders of THE REAL ESTATE COMBINE will be held at the principal office of said Corporation, said principal office being situated at No. 14 Sansome St., Room No. 15, San Francisco, California, on THURSDAY, the 17th day of January, A. D. 1901, at the hour of 3 o'clock P. M. of said day; said meeting being held for the purpose of electing a Board of Directors to serve for the ensuing year and for the transaction of such other business as may come before the Meeting.

GEORGE STERLING, Secretary of The Real Estate Combine.

Principal Office—No. 14 Sansome St., Room No. 15, San Francisco, California.

Annual Meeting.

The Regular Annual Meeting of the Stockholders of THE REALTY SYNDICATE will be held at the principal office of said Corporation, said principal office being situated at No. 14 Sansome St., Room No. 15, San Francisco, California, on THURSDAY, the 17th day of January, A. D. 1901, at the hour of 11 o'clock A. M. of said day; said meeting being held for the purpose of electing a Board of Directors to serve for the ensuing year and for the transaction of such other business as may come before the Meeting.

J. C. WINANS, Secretary of The Realty Syndicate.

Principal Office—No. 14 Sansome St., Room No. 15, San Francisco, California.

Annual Meeting.

The Regular Annual Meeting of the Stockholders of the PIEDMONT DEVELOPMENT COMPANY will be held at the principal office of said Corporation, said principal office being situated at No. 14 Sansome street, Room No. 15, San Francisco, California, on WEDNESDAY, the 16th day of January, A. D. 1901, at the hour of 3 o'clock P. M. of said day; said meeting being held for the purpose of electing a Board of Directors to serve for the ensuing year and for the transaction of such other business as may come before the meeting.

GEORGE STERLING, Secretary of the Piedmont Development Company.

Principal office—No. 14 Sansome street, Room No. 15, San Francisco, California.

Annual Meeting.

The Regular Annual Meeting of the Stockholders of the MUTUAL INVESTMENT UNION will be held at the principal office of said Corporation, said principal office being situated at No. 14 Sansome street, Room No. 15, San Francisco, California, on MONDAY, the 21st day of January, A. D 1901, at the hour of 3 o'clock P. M. of said day, said meeting being held for the purpose of electing a Board of Directors to serve for the ensuing year and for the transaction of such other business as may come before the meeting.

J. C. WINANS, Secretary of the Mutual Investment Union.

Principal office—No. 14 Sansome street, Room No. 15, San Francisco, California.

NOTICE OF AMENDMENT OF ARTICLES OF INCORPORATION.

Notice is hereby given that it is the intention of the JAMISON MINING COMPANY to amend its Articles of Incorporation by substituting for the second of said articles setting forth the purposes of the Corporation, which now reads:

"2nd. That the purposes for which it is formed are: The acquisition of quartz mines and gravel mines in the State of California, and to work the same for gold and silver; also, to acquire, hold and use water and water-rights and privileges in connection with such mining; also, to acquire, hold and use timber lands in connection with such mining," the following:

Second:—That the purposes for which it is formed are: To mine for, and mill and reduce ores of all kinds; to acquire by location, purchase or otherwise, to own, hold, work and operate mines in and throughout the State of California; to acquire by purchase or otherwise, to own, hold, develop, improve, lease, let, mortgage, grant, bargain, sell and convey mines, and mining claims and properties in the State of California; to acquire, by purchase or otherwise, to build, erect, construct, own, operate, lease, let, mortgage, grant, bargain, sell and convey mills, and other reduction and smelting works, for the milling and reduction and smelting of ores, and to deal in precious metals and minerals and the products of mines of every kind, and to transport and provide ways and means to transport the same to market, and to market and sell the same; to acquire, by purchase or otherwise, to improve, develop, own, hold, use, lease, let, mortgage, grant, bargain, sell and convey real property, lands, water, water-rights, privileges, and franchises of every kind, in and throughout the State of California; to buy, own, hold, sell and generally deal in goods, wares and merchandise, and all kinds of personal property, including the stocks of other corporations, also bonds, notes and personal securities of every kind. To establish and maintain agencies of said Corporation, and to appoint and employ agents, wherever it may be deemed best by said Company; and generally to do any and everything necessary, proper or expedient to carry out the aforesaid purposes and carry on the business of said Corporation.

NOTICE OF STOCKHOLDERS' MEETING.

A Special Meeting of the Stockholders of the JAMISON MINING COMPANY for the purpose of considering and acting upon the matter of Amending its Articles of Incorporation, as above provided, will be held at the office of the company, room 54, 120 Sutter street, San Francisco, California, at two o'clock P. M. on Monday, the 11th day of February, 1901.

By order of the Board at its meeting of December 31st, 1900. SAM W. CHEYNEY,
Secretary Jamison Mining Company.

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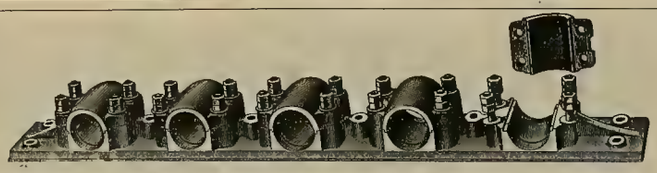

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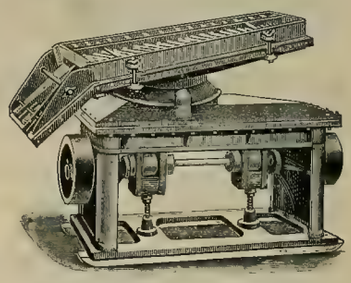

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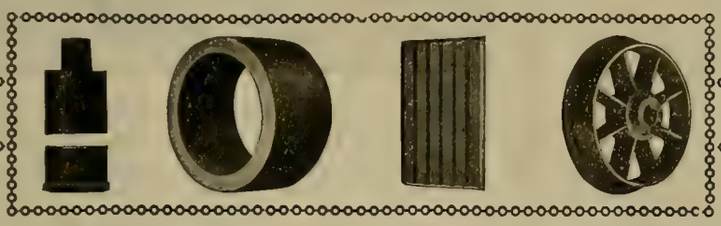

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THE CALIFORNIA DEBRIS COMMISSION, HAVING received applications to mine by the hydraulic process from John Costa et als., in the Lady's Canyon Mine, near Sierra City, Sierra Co., to deposit tailings in worked-out pits; from W. B. Dudley et als., in the Dudley Placer Mine, near North Columbia, Nevada Co., to deposit tailings in a worked-out pit; from the Eagle Gold Mining Co., in the Reichel Claim, near Mountain Ranch, Calaveras Co., to deposit tailings in Murray Creek; and from the Emery Gold Mining and Water Co., in the Rose Hill Mine, near Mountain Ranch, Calaveras Co., to deposit tailings in Murray Creek, gives notice that a meeting will be held at Room 59, Flood Building, San Francisco, Cal., on January 14, 1901, at 1:30 P. M.

ASSESSMENT NOTICES.

NATIONAL CONS. MINING COMPANY.—Location of principal place of business, San Francisco, California; location of works, Rich Gulch, Shasta County, California.

Notice is hereby given, that at a meeting of the Board of Directors, held on the 1st day of December, 1900, an assessment (No. 13) of five (5) cents per share was levied upon the capital stock of the corporation, payable immediately in United States gold coin to the secretary, at the office of the company, 773 Mission St., San Francisco, California.

Any stock upon which this assessment shall remain unpaid on the 10th day of January, 1901, will be delinquent, and advertised for sale at public auction; and unless payment is made before, will be sold on MONDAY, the 11th day of February, 1901, to pay the delinquent assessment, together with the costs of advertising and expenses of sale.

By order of the Board of Directors.

GEO. W. FLEISSNER, Secretary.

Office—773 Mission St., San Francisco, California.

MARIPOSA COMMERCIAL AND MINING COMPANY.—Location of principal place of business, San Francisco, California; location of works, Mariposa County, California.

Notice is hereby given, that at a meeting of the Board of Directors, held on the 24th day of December, 1900, an assessment (No. 20) of Ten ($10) Dollars per share was levied upon the capital stock of the corporation, payable immediately in United States gold coin, to the secretary, at the office of the company, 320 Sansome street, room 24, San Francisco, California.

Any stock upon which this assessment shall remain unpaid on the 11th day of February, 1901, will be delinquent, and advertised for sale at public auction; and unless payment is made before, will be sold on SATURDAY, the 2nd day of March, 1901, to pay the delinquent assessment, together with the costs of advertising and expenses of sale.

By order of the Board of Directors.

JOSEPH H. MOOSER, Secretary.

Office—320 Sansome street, room 24, San Francisco, California.

GOULD & CURRY SILVER MINING COMPANY.—Location of principal place of business, San Francisco, California; location of works, Virginia, Storey County, Nevada.

Notice is hereby given, that at a meeting of the Board of Directors, held on the 4th day of December, 1900, an assessment (No. 93) of ten (10) cents per share was levied upon the capital stock of the corporation, payable immediately in United States gold coin, to the secretary, at the office of the company, room 69 Nevada block, No. 309 Montgomery street, San Francisco, California.

Any stock upon which this assessment shall remain unpaid on the 7th day of January, 1901, will be delinquent, and advertised for sale at public auction; and unless payment is made before, will be sold on MONDAY, the 28th day of January, 1901, to pay the delinquent assessment, together with costs of advertising and expenses of sale.

By order of the Board of Directors.

ALFRED K. DURBROW, Secretary.

Office—Room 69, Nevada block, No. 309 Montgomery street, San Francisco, California

---

MAY DAY GOLD & SILVER MINING COMPANY.—Location of principal place of business, San Francisco, California; location of works, Calaveras County, California.

Notice is hereby given, that at a meeting of the Board of Directors, held on the 30th day of November, 1900, an assessment (No. 5) of five (5) cents per share was levied upon the capital stock of the corporation, payable immediately in United States gold coin, to the secretary, Edward H. Stearns, at his office. Room 801 Claus Spreckels Building, Cor Third and Market Sts., San Francisco, California.

Any stock upon which this assessment shall remain unpaid on the 8th day of January, 1901, will be delinquent, and advertised for sale at public auction; and unless payment is made before, will be sold on TUESDAY, the 19th day of February, 1901, to pay the delinquent assessment, together with the costs of advertising and expenses of sale

By order of the Board of Directors.

EDWARD H. STEARNS, Secretary.

Office of the Company—Heald's Business College, 24 Post St., San Francisco, California.

SILVER KING MINING COMPANY.—Location of principal place of business, San Francisco, California; location of works, Pioneer Mining District Pinal County, Arizona Territory.

Notice is hereby given, that at a meeting of the Board of Directors, held on the 13th day of December, 1900, an assessment (No. 22) of twenty-five (25) cents per share was levied upon the capital stock of the corporation, payable immediately in United States gold coin, to the secretary, at the office of the company, No. 310 Pine street, Room 36, San Francisco, California.

Any stock upon which this assessment shall remain unpaid on the 22d day of January, 1901, will be delinquent, and advertised for sale at public auction; and unless payment is made before, will be sold on TUESDAY, the 19th day of February, 1901, to pay the delinquent assessment, together with the costs of advertising and expenses of sale.

By order of the Board of Directors.

J. W. PEW, Secretary.

Office—310 Pine street, Room 36, San Francisco, California.

EUREKA CONSOLIDATED DRIFT MINING COMPANY.—Location of principal place of business, San Francisco, California; location of works, Placer County, California.

Notice is hereby given, that at a meeting of the Board of Directors, held on the 11th day of December, 1900, an assessment (No. 28) of one-half cent per share was levied upon the capital stock of the corporation, payable immediately in United States gold coin, to the secretary, at the office of the company, Room 31, 214 Pine street, San Francisco, California.

Any stock upon which this assessment shall remain unpaid on the 15th day of January, 1901, will be delinquent, and advertised for sale at public auction; and unless payment is made before, will be sold on TUESDAY, the 5th day of February, 1901, to pay the delinquent assessment, together with the costs of advertising and expenses of sale.

By order of the Board of Directors.

GEO. W. DIXON, Secretary.

Office—Room 31, 214 Pine street, San Francisco, California.

ORLEANS MINING COMPANY.—Location of principal place of business, San Francisco, California; location of works, Grass Valley, Nevada County, California.

Notice is hereby given, that at a meeting of the Board of Directors, held on the 8th day of December, 1900, an assessment (No. 10 new series) of 3 cents per share was levied upon the capital stock of the corporation, payable immediately in United States gold coin, to the secretary, at the office of the company, 324 Pine street, San Francisco, California.

Any stock upon which this assessment shall remain unpaid on the 19th day of January, 1901, will be delinquent and advertised for sale at public auction; and unless payment is made before, will be sold on SATURDAY, the 16th day of February, 1901, to pay the delinquent assessment, together with the costs of advertising and expenses of sale.

By order of the Board of Directors.

GEO. P. THURSTON, Secretary.

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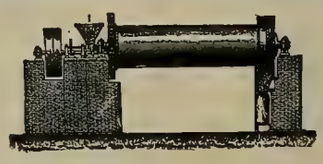

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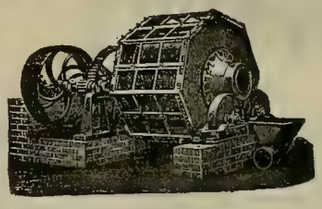

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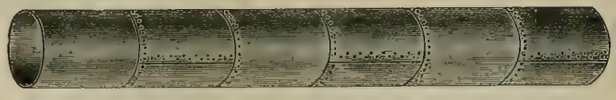

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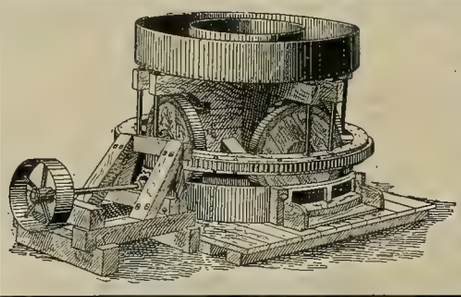

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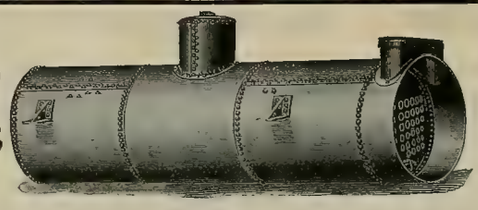

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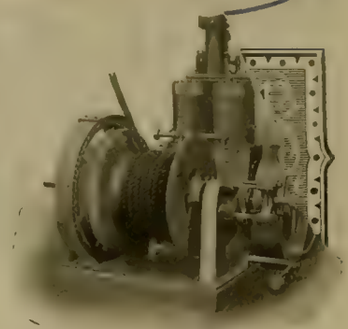

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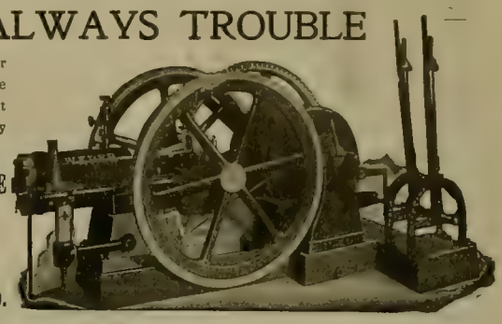

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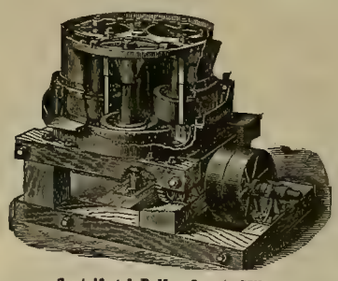

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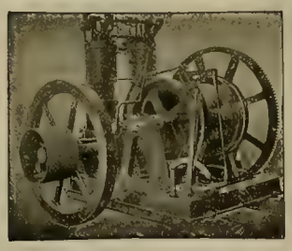

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MINING AND SCIENTIFIC PRESS.

Whole No. 2112.—VOLUME LXXXII. Number 2. SAN FRANCISCO, SATURDAY, JANUARY 12, 1901. THREE DOLLARS PER ANNUM. Single Copies, Ten Cents.

Progress in Explosives.

In the last volume appeared herein a series of articles on high explosives giving the details of manufacture and their relative efficiency in mining operations. This department of science has exhibited some progress in the last quarter of a century.

In 1873 the only prominent explosives, other than gunpowder, were dynamite and a few preparations of nitrocellulose. Nitroglycerine and nitrocellulose—the only explosives of the kind in use in 1873—are still the main ingredients of the bulk of explosives as now manufactured; sixty-two of the eighty-one explosives on the list consist mainly of either nitroglycerine or nitrocellulose, or of a combination of the two. Scientific knowledge regarding the character of explosives has, however, greatly increased, and it is now generally possible to form a fair estimate of the possible value of any explosive from its composition alone. Thermo-chemistry has made great strides in the interval; and though it is not advisable in this, as in anything else, to rely on theory alone in the selection of explosives for any particular use, it becomes a factor in such selection. General knowledge regarding the conditions to insure safety have also greatly advanced.

Because of the genius of the late Alfred Nobel, nitroglycerine has been converted into a gelatinous solid, free from the danger attached to the use of liquid nitroglycerine, almost as powerful, and readily lends itself to the production of explosives of varying power and intensity of action. This invention, owing mainly to insisting on the production of a blasting gelatine free from the dangers of liquefaction and exudation, has led to increase in knowledge of the character of nitrocellulose.

In 1873 nitrocellulose was divided practically into two kinds only—so-called insoluble nitrocellulose or guncotton and soluble nitrocellulose or collodion cotton—the solvent implied being a mixture of ether and alcohol. Now it is of common knowledge that solubility in ether or alcohol is not, as was supposed, a function of the degree of nitration, but solely one of method of manufacture. Nitrocellulose of very varying degrees of nitration, up to trinitrocellulose, can now be manufactured soluble in the above mixture. The most remarkable and far-reaching advance in the use of guncotton and nitroglycerine—an advance based, in a measure, on the discovery of blasting gelatine by Alfred Nobel—is the recognition of the fact that, by converting these two materials into hard homogeneous non-porous solids, they lose their character of detonating agents, and may be used as effective propellants. The rate of combustion of these gelatinized explosives is under perfect control, inasmuch as they burn only on their surfaces by varying the relation between weight of explosive and surface exposed. Almost all smokeless powders, which have added so much to the power and utility of modern guns, are based on this discovery.

Another important advance, owing mainly to Dr. Sprengel, is the substitution of ammonium nitrate for saltpeter in many explosives. The value of this compound lies partly in the fact that it leaves no solid residue on combustion, partly that it reduces the temperature of explosion of all explosives in which it is employed. The latter fact chiefly renders it so valuable an ingredient in the so-called safety explosives. A great drawback to its use, however, is its property of rapidly absorbing moisture from ordinary atmospheric air, which renders a waterproof wrapper or case necessary.

The type of smokeless powder consisting of pure guncotton was developed by the French. Nobel developed a successful smokeless powder by combining soluble collodion cotton with nitroglycerine. H. S. Maxim was the first to make a smokeless powder consisting of nitroglycerine and true guncotton. The first to patent it and the first to use it, Maxim was also the first to combine oils and paraffines with smokeless powder to prevent detonation.

Concurrently with the introduction of ammonium nitrate came the use of various nitro derivatives of the so-called aromatic compounds, which, though usually not of a composition to serve as explosives by themselves, yield powerful explosives in admixture with ammonium nitrate.

The only compound of this class which is at present largely used as an explosive by itself is tri-nitrophenol or picric acid, which, now known as a powerful detonating explosive, was manufactured for many years, and in considerable quantities, as a valuable yellow dye, without a suspicion of, and with utter disregard to, its highly explosive character. It furnishes a striking illustration of the danger involved in proclaiming an explosive to be perfectly safe on the strength of its having been manufactured and used for some years without accident.

Nugget Stamp Mill, Boulder Co., Colorado.

Nugget Stamp Mill, Boulder Co., Colo.

Herewith is presented a mountain view typical of that section of Colorado, showing the Nugget 10-stamp mill, with plates and Cammet concentrators, which was recently started up. The power is supplied by a Stilwell-Bierce water wheel, operated from a 1-mile water pipe line. There is, however, an auxiliary steam power plant in the mill. The 1000-foot tramway line shown conveys the ore from the mine, which is located at a higher point. John L. Tidball of Crete, Neb., is largely interested in the property, with L. H. Dennison as manager. The stamps and other iron work were turned out of the Denver shop of McFarlane & Co., Hendrie & Bolthoff of Denver, Colo., having the contract to supply all the machinery.

New Plant of the Vulcan Iron Works Co., Seattle, Wash.

Vulcan Iron Works, Seattle, Wash.

The accompanying engraving portrays the new and enlarged establishment of the Vulcan Iron Works Co., of Seattle, Wash., which among other things is just now making a record in shipping logging engines, as shown in the engraving. The mining activity in Alaska, British Columbia, Washington and Oregon has encouraged this establishment in increased manufacture of mining machinery as well as mill and marine supplies. Jacob Furth is president of the company; H. P. Strickland, secretary, and Isaac Hulme, general manager.

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San Francisco, January 12, 1901.

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ONE of the reasons why mining men everywhere like this paper and constantly read it is because of the practical articles written for it by experienced men who do the things they write about, and who, because of their ability, have charge of big enterprises. For instance, in this issue is the second and concluding part of an article on how to work an inland gold dredger, written by a man who has made a specialty of that kind of work in California. Any one who reads that article and is at all interested in gold dredging feels that he has there the latest and best that can be said thereon, not from a theoretical point of view, but from the standpoint of one who has studied out many theories, tried them, adopted some, discarded others, and made a financial success of his work. Another article on how to treat a flat wire rope used in mine hoisting is written by the master mechanic of the Portland Gold Mining Co. at Victor, Colo. Like the article on dredging, the one on the homely, but important subject of proper treatment of a wire hoisting cable, is written by an expert. That article tells how to save men's lives. Mr. Eteson's article tells how to save and make money. Both are written by specialists in their respective lines, and mining men everywhere are always interested in anything that tends to increased safety of life or economy of operation. The special article on high-pressure centrifugal pumps, by Jno. Richards (whose name is known in both continents), is believed to be the first publication of the matter in this country. It is characteristic of broad gauge miners, metallurgists and engineers to interchange knowledge that results in common benefit, and, through the years, a large store of valuable information has thus been afforded in that way through our columns. Of course all men do not think alike. There are men who believe it a business mistake to tell what they call "trade secrets;" but, as a general thing, those men never rise above the dull level of mediocrity. The fact that they fear that others may find out as much or as little as they know stamps their caliber. Such small-minded views of life are not consistent with the dignity and progress of the day. The man who jealously conceals what he is pleased to think he alone knows will end by thinking that he knows it all. None of us know much, but by general contribution the common stock of knowledge is increased. The fact that a man knows or thinks he knows something of value should be the strongest incentive to tell his fellow workers in the same line of business, for the day is gone by when any one can expect to make such knowledge of exclusive advantage to himself. It is only by securing the attention of others that knowledge becomes truly valuable, and it is by publishing it in the columns of a widely distributed periodical that such information can be made of most value to himself or any one else.

A Mistaken Assumption.

Much has been said by this paper in past years regarding the province, purpose and manifest necessity of a cabinet department of Mines and Mining, and the value shown of so obviously worthy a measure. There is noted the December meeting of the Central Mining Institute of western Pennsylvania, on which occasion the principal topic of discussion was "Would the Establishment of a National Mining Bureau at Washington Promote the Advancement of the Science of Mining and be Conducive to the Interests of the Mining Industry in General and be a Benefit to the Public at Large?" The discussion thereon appears to have taken the form of an assumption that the U. S. Geological Survey was not doing good work, and that because of this the establishment of such a department was necessary to aid the mining industry, the idea being a sort of antagonistic one in general to the U. S. Geological Survey. It is unfortunate that the friends of the measure in western Pennsylvania so misunderstand the whole purport of the effort as to feel called upon to make any attack, either implied or direct, upon the U. S. Geological Survey. The U. S. Geological Survey is not at all in evidence in the matter, nor are its valuable services in any way questioned. There is no antagonism between the U. S. Geological Survey and the proposed cabinet department of mining. The two things are entirely distinct and separate, and those who have given the matter serious attention understand this perfectly; nor is there any antagonism on the part of the U. S. Geological Survey officers against the proposed measure. We have the assurance of several of them that they feel kindly disposed toward the proposition, recognizing its necessity and value and that it can in no way interfere with their legitimate work, but would rather tend to aid and promote it. The whole thing illustrates the tremendous amount of public ignorance on that subject, even among those who by reason of their position would naturally be supposed to know something about it, and that is the one almost insuperable obstacle in the way of success.

The idea of those who want a cabinet department of mines and mining created is not of antagonism or of superseding anything of merit, but to create an opportunity not now existing for further development of the mining industry and for intelligent and final adjudication of matters constantly arising that are not susceptible of proper solution either by the legislative or judicial functions of the Government, but which naturally belong to the executive management thereof. It is not uncommon to have contradictory rulings follow each other from subordinates in the office of the Secretary of the Interior on precisely the same question, and it tends to mix the ordinary mining man up considerably to be told that "he can and he can't; he will and he won't; he'll be damned if he does, and be damned if he don't." There are increasing difficulties every year that can only be removed by the creation of the department advocated.

The idea in general is to introduce the same progressive system in all matters relating to the mining industry of the United States that has been introduced concerning other branches of the public weal not more important than the great basic industry of the nation. Where rightly understood this manifest necessity and justice makes friends and advocates everywhere, but it would appear that there are times and occasions when it has more to fear from its friends than from its foes—when the former mistakenly attempt to advance its progress by attacking such an institution as the U. S. Geological Survey, that only deserves unanimous praise for efficient public service.

THE Leadville, Colo., News-Reporter issued an illustrated New Year's edition, edited entirely by volunteers. The exchange editor starts out by saying: "The first paper I opened was the MINING AND SCIENTIFIC PRESS." Of course.

Stamp Milling Methods.

The difference between the "California" and "Colorado" systems of stamp milling has been so exhaustively discussed that little remains to be said on that point.

Ordinarily in California quartz mining, gold ores consist principally of quartz and schists carrying free gold and rarely more than 4% sulphurets, the oxidized ores sometimes extending to a depth of 750 feet. The rapid-drop California stamp mill, effective in crushing and simple in amalgamation, secures good results, saving from 80% to 95% in treating free gold ores with the minimum amount of sulphides.

So far as surface ores are concerned, there is little difference between those of California and Colorado; but in the latter State the oxidized area extends to a depth much less than in California—sometimes less than 100 feet—and below that carries a far greater proportion of sulphides than do the California ores at any ordinary depth. To successfully treat those sulphides the Colorado slow-drop, fine-crushing system, with its introduction of amalgamated plates inside of the mortar and the production of a maximum amount of slimes, seems more satisfactory to some, though in many instances the "Gilpin county bumper" and the slow-drop stamp are being replaced by other makes of concentrator and rapid-drop heavier stamps. Miners of Clear Creek, Colo., claim that better results are obtainable from the slow-drop, double-issue stamp mill than from the heavy-stamp, quick-drop, single-issue mill; that in the former a larger percentage of the gold is saved in the batteries and tables, the wear and tear much less, and that, while some gold goes off in the tailings, it is obtained by concentration and sale to the smelters. They hold that the latter named mill wears out faster in shoes and dies, that the screens are crowded, the crushing not fine enough to permit general amalgamation; that they prefer to have richer plates and leaner concentrates.

It is not so much a difference between California and Colorado systems as it is a question of suiting the process to the ore, which is always more desirable than trying to suit the ore to the process.

Whether it be Utah, Arizona or British Columbia, the "California" system would doubtless be most satisfactory for the kind of ore most ordinarily found in California and the "Colorado" system equally efficacious for such classes of ore as that found therein. The name is of less importance than the adjustment of methods.

It is believed, however, that modern methods of stamp milling and general treatment of low-grade ores suggest the economic advisability of coarse concentration followed by amalgamation. This matter of concentration is of prime importance, and is taking precedence in the minds of many progressive millmen over the old threshed-out question of drops and weights and duties of stamps.

Sulphide ores are extraordinarily friable, and hence fine crushing occasions the production of considerable slimes, in which are frequently carried off, mechanically, a large percentage of the gold contents of the ore. Coarse crushing and improved concentration methods can reduce to a minimum the production of such slimes, the contained particles of sulphides being coarser and more readily separated from the worthless gangue, and the tailings after the separation of such heavy sulphides, if containing gold, in good condition for treatment by amalgamation.

WHETHER it is best for a district or not to have "foreign" capital develop it, is again being discussed, the singular argument being advanced as it occasionally is, that "foreign" capital is objectionable inasmuch as the profits go out of the country. It really makes very little difference whether the capital to develop a mining district is "foreign" or domestic. It is development that most districts need, and that always requires money, and it is of minor import where that money comes from. No one should grudge the profits resultant to such investment, even though they be "carried out of the country," as nine dollars are left behind for every one dollar carried away. The wage earner, the manufacturer, the local merchant, all come in for a share of such disbursement, and the life and prominence imparted to a district aids further exploitation.

Concentrates.

WATER can be pumped out of a closed tank if the tank is not air-tight.

AT 100 pounds gauge pressure steam weighs .264 pound per cubic foot.

"THE cost of a horse power" at Niagara Falls, N. Y., is $17.50 per electrical horse power per year.

THE copper production of the United States for 1900 is estimated at 603,000,000 pounds of fine copper.

THE altitude of the Payne mine, Slocan, B. C., is 7200 feet. There exist there both fissure and bedded veins.

THE largest consolidated gold fund in the world is in the United States Treasury. On the 1st inst. it amounted to $479,349,250.

THE recent published vagaries of Nikola Tesla are not to be given serious attention and are interesting only for their notable absurdity.

AUSTRALIA requires mine superintendents to be licensed, and fines a miner for returning to a missed-fire shot within three hours' time.

CHEMICALLY pure lead is not in sufficient demand to be quoted commercially, but can be had from any prominent dealer in assayers' supplies.

SODA ASH is the most economical substance to use for neutralizing in a boiler the bad effect of feed water strongly impregnated with $H_2 SO_4$.

SILICIFIED fossil trees are found in Arizona and Montana, in the latter State 3 miles south of Sun river, in the northern part of Lewis & Clarke county.

A CAST-IRON BALL 6¾ inches diameter will weigh 30 pounds; 6¾ cubed=220.34; that multiplied by .5236=115.37=cubic inches; that ×.26=29.99 pounds.

AN affidavit of assessment work recorded within six months after the time within which the labor had to be performed is prima facie evidence of such labor.

THE efficiency of a steam engine is about 15% of the power due to the heat generated by the fuel. The efficiency of a gas engine is about 34% of the total heat units generated by the fuel.

TRACTION ENGINES have hauled thirty tons ore daily, a distance of 30 miles, over a road with long 10% grades from Bisbee, Arizona, at an estimated cost for labor, fuel and oil of 27 cents per ton.

IN one form of use of the cyanide process the ore is treated in revolving barrels, instead of in a vat, the company claiming that the percentage of extraction is greater and the time required less.

AT the Green Mountain mine, one of the Anaconda, Montana, copper properties, copper has been found by the diamond drill at a depth of 2200 feet. The High Ore shaft is to have a depth of 4000 feet.

ASSESSMENT WORK by the locator of a claim who had previously failed to do assessment work upon the ground, so that it was subject to relocation, will prevent any relocation by other parties subsequent to the performance of such work.

THERE is no silver or gold mine in Colorado below an altitude of 7500 feet, and few below an altitude of 8000 feet. There are several gold mines in California the bottom workings of which are from 300 to 500 feet below sea level.

UNDER the present tariff law all coal containing less than 92% of fixed carbon is classed as bituminous coal, and if exported is liable to a duty of 67 cents per ton. This construction excludes anthracite coal from the free list altogether.

ASSESSMENT WORK may be done beneath the surface, on a lode having its apex outside the surface line, or upon other claims or other ground in reasonable proximity to the claim if tending directly to the development or improvement of the claim.

NO ACCURATE statement of the gold or silver yield of any State or Territory for the past year has yet appeared, and necessarily can not be made for the next three months. The 1900 gold yield of California is greatly understated in all the estimates yet made.

IT will be forty-two years on the 21st inst. since Geo. Jackson made the first recorded discovery of gold in Colorado, at Jackson's bar, now Idaho Springs. It will be fifty-three years on the 19th since Jno. W. Marshall made the historical discovery of gold at Coloma, Cal.

TO SOFTEN cast iron for drilling, heat to a cherry-red, having it lie level in the fire; then, with tongs, put on a piece of brimstone, a little less in size than the hole is to be. This softens the iron entirely through. Let it lie in the fire until slightly cooled, when it is ready to drill.

THE lighter hydrocarbon oils are the first distillate from crude petroleum. The vapors pass through the same still as the heavier oil, but are switched off into separate tanks as the gravity of the distillate increases. The gravity is tested as the liquid flows by a hydrometer.

WOODEN water pipe might be used to advantage, and if made of staves and bound together with iron hoops are capable of standing considerable pressure, as high as 100 pounds to the square inch, but iron and steel pipe is now so cheaply made that economy would not suggest the general use of wood for piping.

A CIRCULAR tapering tank, diameter at the bottom 60 inches, diameter at top 48 inches, height 10 feet, filled with water to one-half its height, has in it 663 gallons—diameter at water line 60+48÷2=54 inches; $60^2 : 54^2 : (60+54) \times .7854 \times 60 \div 3 = 153{,}247$ cubic inches, divided by 231=663 gallons.

IN the chlorination process the more copper in the ore the greater the consumption of chemicals. Where pyrites are copper-bearing forty to fifty pounds bleach and that equivalent amount of sulphuric acid may be required, while where clear iron pyrites are treated only ten or fifteen pounds are necessary.

AN alloy for a dynamo brush to combine conductivity with the minimum of friction is copper with .2% of bismuth, .3% of cadmium and 1.5% of antimony. If the commutator is of hard bronze, the ingredients added to the copper should be doubled in quantity; and if the commutator is of steel, they should be trebled.

'TIS hard to restore burnt steel. The following may serve: Borax, 3 ounces; sal ammoniac, 8 ounces; prussiate of potash, 3 ounces; blue clay, 2 ounces; rosin, 1½ pounds; water, 1 gill. Put all over a slow fire; let it simmer till it dries to a powder; heat the steel to a cherry-red, dip into this powder and afterward hammer.

IN manufacturing sulphuric acid in San Francisco or at sea level the chamber space needed is from 20 to 25 cubic feet per pound of sulphur burned in twenty-four hours. At Denver, Colo., as the altitude entails a smaller weight of oxygen in a certain cubic space, the chamber for such manufacture would have to be about 10% larger than at sea level.

WHERE three men carry a log 18 feet long of equal weight throughout, one man at the end, the other two using a cross stick, the weight equally distributed, the cross stick is to be placed 4½ feet from the end of the log. In that way the two men holding it will each carry one-third the log's weight and the man at the end will carry the other one-third.

A GOOD semi-liquid belt grease can be made as follows: Melt 6 kilograms of perioline, 2.5 of fish oil, 5 of resin, 2.5 of wool fat, and add 1 kilogram of gum solution, and, when stirring, 1 kilogram of tallow. Pour the mass into suitable vessels and continue stirring until cool. If it is wanted in sticks, add to the mixture 10 kilograms of resin and 7 of ceresine, and mould and shape to suit.

PYROZONE is the druggists' name for peroxide of hydrogen, a 3% solution of $H_2 O_2$ in permanent solution, for internal or external use, and an antidote for cyanide poisoning. In such case the stomach is washed out with it and hypodermic injections made every five minutes in different parts of the body. It forms, with the hydrocyanic acid, the harmless chemical compound oxamide.

METALLIC GOLD is not dissolved by any single acid. It is acted upon by acid mixtures, such as nitro-muriatic, which liberate chlorine. It also dissolves when heated with strong sulphuric acid and a little nitric acid. According to all accessible authorities, gold is insoluble in a "nitric acid in which there has taken place a decomposition, and some of the nitrous acid group has been liberated."

THERE are no overlapping mining claims in Mexico. The Government makes no distinction between a native and a foreigner; either may denounce mineral veins which have no legal owner by paying the regular fee for each pertenencia (a square 100 meters on each side). An annual tax of $10 for each pertenencia is required by the Government. Ownership is forfeited by a failure to pay this tax, and not by a failure to work the mine.

IN the Houghton, Mich., copper district the shaft a mile deep, mentioned last week, is on the amygdaloid, an old lava flow, the fissure veins having all pinched out at a depth of between 2000 and 3000 feet. The mass of mines were usually opened on the fissure veins crossing the formation transversely. Masses of copper of several tons weight are found in the Quincy and other amygdaloid or conglomerated lodes, but nothing as large in size as those found in the fissure veins.

ON the northern coast of California, near Gold Bluff, gold-bearing beach sands are still profitably operated. The panning surfs of the ocean act as gigantic concentrators. There are two kinds, the "straight in surf" and the ordinary panning surf. The "straight in" is occasioned by the western wind, accumulating the sand upon the seashore. The panning surf comes with a northwest or southwest wind, exercising a rocking motion on the cumulative sand heaps, panning them down and preparing the material for the puny appliances of the beach miner.

IN CHLORINATION, lead in the ore occasions an extra consumption of chlorine, though a heavy galena percentage in gold ore concentrates usually indicates considerable accompanying silver, which, in chlorination, is not wholly satisfactory. Unless a chloridized roast is used, lead, even in considerable quantity, does not materially affect the fineness of the precipitate, but the addition of even a small amount of salt to the roasting ore converts quantities of lead into chloride, which, being dissolved and finding its way into the gold tanks, is there thrown down as sulphate, to the deterioration of the gold precipitate, the result being a base bar.

TO WORK flat placer ground where there is no fall for head of water or tailings, a good gold dredger, or, if practicable, a hydraulic elevator could be used to advantage. A primitive plan put into successful practice in working flat placers in Montana is to build a line of sluices from 10 to 15 feet above the ground, supported by posts. The sluices should have a fall of not less than 4 inches in 12 feet, or more if both the gold and gravel are coarse. The water is pumped up in the head sluice, the gravel carried up dry by a bucket elevator and slid into the sluice box, where it mingles with the water, the gold being caught in the riffles in the sluice boxes, the gravel out of reach of the elevator being brought from a short distance by scrapers, the pump and elevator to be moved when the distance became too great.

CONCERNING tempering drills for hard rock a California drill sharpener says: "I find it necessary to pay particular attention to the heating of steel; heat slowly and not overheat. After sharpening drills to suit convenience, lay aside to cool; then make a clear fire, heat drills to cherry-red (for ordinary steel, the heat to be regulated by results obtained); then plunge in clear water. Next I take a box about 2 feet long, 2 inches deep, 4 inches wide, with only one end in it, into which I throw a handful of sand, then take the tempered drills and rub briskly across the sanded bottom five or six times in order to put a little polish on the drills to better observe the change of color when drawing the temper. Next place a bar across the top of the fire, lay the drills on the bar over a slow fire, and when you find the temper to a very light straw, dip in water just for one moment, then throw on the floor to cool; when cool they are ready for use."

THE rusty gold in the Snake river, Idaho, placers is caught on a copper-silver plate rocker, the setting of which requires dexterity. The plate is first annealed, roughed with nitric acid, brightened with cyanide of potassium, then a little silver nitrate is put on with the quicksilver, the silver being subsequently partially removed with nitric acid. The plate is next set with gold, the little gold specks not left loose but set hard with fire, this leaving the plating very rough. Finally quicksilver is put on, and the gold slightly smoothed with a spatula. The plate is now full of little pockets or riffles, which catch and retain the coated gold until it is brightened by cyanide or cut with acid. The ordinary smooth plate with soft silver amalgam could not do the required work. This rough plate, however, though wet with quicksilver and set at a steep grade, retains the rusty gold. The "burlap process" works well where there is no slime or magnetic sand. That was described on page 609 of the issue of Dec. 29, 1900.

THERE is a metallic alloy invented and patented in Germany to take the place of gold, which, even if exposed for some time to the action of ammoniacal and acid vapors, does not oxidize or lose its gold color. It can be rolled and worked like gold and has the appearance of genuine gold without containing the slightest percentage of that metal. It is much cheaper than other compounds and alloys used as substitutes for precious metals. The alloy consists of copper and antimony in the approximate ratio of 100 to 6 and is produced by adding to molten copper, as soon as it has reached a certain degree of heat, the antimony. When the antimony has been thoroughly diffused with the copper, charcoal ashes, magnesium and lime-spar are added to the mass when the latter is still in the crucible. The action of this material admixture of flux is not explained, but the alloy loses thereby a certain porosity otherwise present and greater density of the cast metal is obtained.

LAND from which timber is felled or removed under the provisions of the Act of June 3, 1878, must be known to be of a strictly mineral character, and that it is not subject to entry under existing laws of the United States except for mineral entry. The authority granted by the Act of June 3, 1878, to cut timber applies exclusively to lands which are strictly mineral in character and subject to mineral entry only. The defendant in any suit brought by the U. S. must prove by a preponderance of evidence that such lands are more valuable for the mineral than for any other purpose, and that they are not suitable for agricultural purposes or cultivation or valuable solely for the timber thereon. Parties who take timber from the public lands under assumed authority of said Act of June 3, 1878, do so at their own risk, and must stand prepared to show that their acts are within the prescribed terms of the act granting such privilege; in other words, the burden is on such parties of proving by a preponderance of evidence that the land from which the timber is taken is "mineral" within the meaning of said act, should the question at any time be raised as to the character of the land.

THE invention for working low-grade gold-bearing ores by means of magnets referred to is probably the one devised by J. A. Ogden, who is reported to have successfully run a small plant in Deadwood, S. D. The machinery consists of a 20 H. P. engine, a dynamo and a roaster. The ore is pulverized to a fine mesh, fed into the upper end of the roaster (which is nothing but a long piece of sheet iron, at an incline, under which a fire is built), and screened through an 80-mesh screen. The ore is then carried to the magnetic separator. The pulverized ore is dropped upon a wide belt, across which there are three narrow belts running at right angles. Above each narrow belt there is a large magnet, kept alive by the electricity generated in the dynamo. The ore passes under these magnets, which pick up the grains of iron, to the under side of the narrow belts running crosswise to the large belt. As soon as the iron is carried out of the magnetic field, a distance of 10 inches from the wide belt, it is then dropped into a hopper, which conveys it to a bin, nothing being left on the main belt except the sand and such gold as may have been freed by the roasting. The sand is then run over amalgamating plates and the concentrates shipped to the smelter.

Suggestions on Inland Dredging.

NUMBER II.

Written for the MINING AND SCIENTIFIC PRESS by P. B ETESON.*

In the previous article I dealt with the starting of an inland dredger and the opening up of a face. I now propose to deal with the handling of different kinds of ground.

I have met many people who, when they come on board a dredger and see a man merely operating levers, think that dredging is child's play, and that any one, as soon as he has mastered the mechanism of the winch, knows all about it.

Now, that is the greatest mistake. Winching can not be learned offhand; it takes time and the handling and working of various kinds of ground before a man becomes at all proficient. It is also not merely a mechanical operation. It does not follow that by simply hoisting and lowering the ladder you are getting all you can out of the machine.

Some men lower their ladder several feet, and, if the ground is caving well, just let their buckets drag through the dirt, and do not make another move until the buckets are empty, and then bury them again. Other men lower their ladder and are content to see bucket after bucket come up empty, and when asked why they are not full answer, "The ground is too hard."

Now, these men are no winchmen. A good winchman works as much with his head as his hands. In good caving ground he has his ladder on the move constantly, always buried enough to get a full bucket of dirt, and not too deep to make the buckets drag. As soon as he sees the ground cave he begins to raise his ladder immediately, so as not to get his buckets buried too deep.

A full bucket of dirt is all that is required—to get more is an impossibility, a great wear and tear and waste of power.

In hard ground the winchman has to work for a bucketful, and if he cannot work the ground from the top he should let the dredger back and come up on the ground along the bedrock. This will enable him to break the ground, cause it to cave more or less, and so get a run of full buckets. So, in working hard ground and clay, once having got to bedrock keep there, or as close to it as possible, and work your ground from the bottom upwards.

All ground is worked to the best advantage from the bottom, for the reason that after a certain quantity has been dug a larger quantity will break away, or cave, and feed the buckets, so that the buckets will have easier digging, and thus use less power and have less wear and tear.

Boats that work down in successive cuts do not have this advantage to so large an extent, and have to dig for more bucketfuls.

I am referring only to moderately hard ground. There is ground that has to be blasted before the dredger comes up to it.

All bucket dredger men know that when the ladder is flat, and digging shallow, the buckets are farther away from the delivery plate than when the ladder is more perpendicular and dredging deep. This, when working land and material that do not deliver freely, causes considerable trouble, for not only does one lose values, but the well hole gets filled up.

The best method to overcome this is to dig as deep as you can, thus keeping your buckets as close to the delivery plate as possible, and so catching a very large percentage. This, however, is not always feasible, and to overcome the difficulty have a slip chute made which will fit inside the delivery plate and hang it so that you draw it in or out, to or from your bucket, and be able to clamp it in any position. Suppose that you can only get down 8 feet with your ladder. Your buckets will be some distance from your delivery plate. In that case slide the slip chute out till it is just clear of your bucket lips and clamp it. Now work your entire face at the 8-foot level. You raise the ladder if necessary, but never lower it beyond the depth at which you set the chute, or you will break it. It is a good plan to mark the depth along the well hole every 2 feet, and place some movable article at the depth at which you set each slip chute. There is then little danger of lowering your ladder beyond it, for as soon as the chafing beam of the ladder comes up to it you must go no farther.

Working an Inland Dredger, Oroville, Cal.

Dredger, With Pile of Tailings, Oroville, Cal.

When you put your chute into another level set your mark at that level on the deck, and so on. A stream of water playing on the delivery plate is a great help in keeping it clear of sand. When you have worked right across the face slide the slip chute in sufficiently to allow you to lower your ladder say 2 feet, and clamp it there.

Now work your entire face to the 10-foot level; repeat this till bedrock is reached.

No hard and fast rules can be laid down in regard to how much to move the chute. A man must use his judgment and adapt this means to circumstances.

If there is a large quantity of top soil or sand which will not deliver freely, with good gravel underneath, work as deep as possible, and by this means the top dirt will mix with the gravel and will deliver more freely.

When very large quantities of sand are encountered above, as well as below, water level, a sand pump taking the sand from one or, if necessary, both sluices and discharging it behind the line of tailings will be found invaluable. I have successfully worked a bank of 29 feet of pure sand—13 feet above water and 16 feet below water, with 4 feet of gravel—for a distance of 150 yards with a slip chute, and a sand pump taking half of the sand.

There are two kinds of bedrock, hard and soft. With the former I have not had much experience, so will deal only with the latter.

I do not advocate side feeding into a high bank, be it tight or loose.

If it is tight, you work it with the side of your bucket lips, and so at a disadvantage; and if loose, you get big caves, which bury your ladder, and if you have a combination winch you lose time in hoisting your ladder or pulling out of the cave.

Work down to bedrock, raise your ladder 6, 8 or 10 feet—according to the ground you are working—move over 4 feet or more, and work down to bedrock again. Repeat this till you have worked over 20 or 30 feet of your face. Now, on the bedrock you will have a series of small mounds, which will not have sufficient body in them to cave and stall your buckets, if of a loose nature; and if hard, it will not have the same solidity as if working into the solid bank.

Now, by keeping the buckets on bedrock and side feeding back, the whole of these mounds can be picked up and the bedrock cleaned perfectly. When this is done push back to where you left off, and repeat. You might work the whole of your face and clean up after, but I advocate cleaning small patches, as you are not so likely to miss any ground, and the ground being kept up to a more finished state as work proceeds.

*The first part of this article appeared in the issue of Dec. 22, 1900.

The Treatment of Flat Hoisting Cables.

Written for the MINING AND SCIENTIFIC PRESS by A. E. JOHNSON.

My experience extending over a period of 20 years in the use of flat cables has convinced me that much, if not nearly all, of the troubles attending the use of such cables can be avoided by giving them just the care and treatment that they require, and that most of the failures are directly traceable to ignorance of those responsible for their care.

It is true that in some instances flat ropes have been turned out of the factory that, owing to carelessness in sewing, have had the strands unequally strained to such an extent that any amount of subsequent care and treatment would fail to bring them to a good condition. In such cases, which I believe are comparatively rare, the only remedy is to renew all such portions that show an unequal tension of the strands.

The following are some of the points we must attend to if we expect to get good service from a flat rope in mine work:

First—See that the reel and sheave wheel are in proper alignment and the sheave wheel shaft is set level; any neglect in this is likely not only to cause an unequal strain on one side of the rope tending to distort it and pull it apart but also to crowd it against one side of the reel or sheave, causing undue wear on the sewing wire and outside strands.

Second—Have the rope of the proper width for reel; about one-twelfth of the width of the rope is as much play as should ever be allowed, less might in some cases be better.

Third—See that the reel arms or rim are very smooth and have no sharp edges, if necessary file them until they are so; it will pay.

Fourth—Wind the rope on the reel under a good strain, so that it will be even and solid. This is especially important when there is considerable unused cable left on the reel when the cage is at the bottom. In this case it is a good plan to lower the cage to the bottom of the shaft and unwind all but one or two turns from the reel, at the same time folding the slack back and forth on the bottom level, then by slowly winding it up again the weight of the rope will give sufficient tension so that all of the rope will have a firm and true running center to wind on.

Fifth—Prevent as far as possible any side swinging of the cable as it winds on the reel. If the distance between the reel and sheave wheel is more than 50 or 60 feet it is apt to acquire a considerable swinging movement allowing the rope to be injured by contact with rim or arms of the reel. To avoid this action it is well to provide a pair of carrier or idler pulleys, one set above and one below the rope, and about midway between the reel and sheave wheel. A set of such idlers which are running and giving good satisfaction at one mine in this district (Cripple Creek) are 20 inches diameter, 10-inch face, of cast iron; pulleys are webbed with rim not less than ⅜ inch thick, are turned straight on face and carefully balanced. The shafts which are keyed to the pulleys are 2 inches diameter and 26 inches long, and run in post boxes which are set in a rigid frame. In some cases it might be advisable to provide for a vertical

movement of the idler frame to accommodate it to the changing position of the rope, but ordinarily it is best to have them rigid, as the strain due to deflecting the rope 2 or 3 degrees is not severe on the journals.

Sixth—Remember that the first starting of a new rope calls for the greatest care and attention. The strain on the strands is never quite equally divided and it requires time and actual service to work out these unequal strains. If it happens that a rope soon after being put in service shows signs of failure, such as a tendency to twist or in any way to be distorted, it is a sure indication that something is wrong, and more, it will never correct itself. The conditions affecting that particular part of the rope must be changed. Changing ends or reversing the rope will allow the strains to work out or be distributed so as to do no harm, and in most cases effect a cure. There seems to be a marked tendency for trouble in a new flat rope to develop at a point where the rope leaves the reel when the cage is at the bottom, as in both starting and stopping the shock is apt to be greatest at that point. However, with a little care and treatment as suggested, there should be no more trouble in that respect, as when the rope has once been properly stretched it is good for years of hard work if properly treated in other respects.

Seventh—Avoid as far as possible the use of clamps or rope marks that cover any portion of the rope and interfere with ready inspection of it. In one instance, at one of the prominent western mines, an apparently perfect ½x5-inch flat rope broke at a point about 50 feet above the cage where a piece of canvas was sewed on as a mark. The canvas had protected the rope from the lubricating compound but not from the mine water, and the rope entirely rusted through. Fortunately the lesson was cheap as there was no one on the cage.

Eighth—The proper lubrication of a wire rope is of the greatest importance, serving, as it does, the double purpose of preventing wear and a protection from rust. In selecting the lubricating material avoid any compound that will tend to dry or cake on the surface of the rope or that is loaded with solid ingredients that tend to separate from the more fluid portions. The use of drying oil is, I think, never satisfactory, as in time it becomes hard, cracks and allows water to get behind it and prevents any ready inspection of the rope. In my experience a heavy petroleum oil, that is prepared with special reference to resisting the action of water and having no acid in its composition gives the best satisfaction.

In this district the most of the mines using flat ropes employ the arrangement shown here, and which was illustrated on page 2 of the issue of December 22. The oil is heated until perfectly fluid and placed in the can. The air hose is connected, and a fine spray is thrown into the rope as it is lowered between the jets. The application of the oil with this arrangement is very thorough, only takes a few minutes and involves no labor to speak of.

The New Risdon Ship Building Plant.

At the Potrero, San Francisco, several hundred men are at work getting the new plant of the Risdon Company in shape for ship-building. Pile drivers are at work building wharves, steam shovels and excavators grading and filling in, and buildings going up over a part of the forty acres of ground owned by the company. The ship joiners' shop is completed and in operation, furnishing work to a number of men. The shop is entirely run by electricity and is equipped with modern wood-working tools. The excavation for the new machine shop required the removal of about 20,000 cubic yards of rock, used in filling in the new ship ways. The machine shop is 300x100 feet, 40 feet in the clear under the overhead traveling crane. Several electric traveling cranes are in storage waiting the erection of the various buildings. The foundry building is about completed and ranks among the largest in the country. The boiler shop is another large building, with a 60-ton overhead traveling crane. The old wharves are being replaced and piles being driven so that large ships can lie alongside the wharves for repairs. The company, although not in shape as yet to execute any large ship-building orders, has contracts for two small boats, one a twin screw boat for the Alaska trade, the other a cargo boat for the Hawaiian trade. This company has also several contracts for gold dredging machinery, a line of business of which they make a specialty. To show how far reaching the demand for successful mining machinery is, may be mentioned that this company is now erecting a large gold dredging plant in Ashanti, on the Gold Coast of South Africa. The machinery for this equipment filled ten cars and was carried through by special train from San Francisco to New York direct. The new electric hoists for the Comstock, six of which are now building at the Risdon shops, are expected to revolutionize mine hoisting there.

Union Iron Works' New Building.

The Union Iron Works of San Francisco will put up a $60,000 building, southeast corner Second and Folsom streets, frontage 100 feet, depth 50 feet, three stories, for the mining machinery department. On the ground floor will be the offices and the show rooms; on the second floor, the drafting department and the pattern shop; the pattern storage room will be in the upper story. In the rear, on Folsom street, will be the machine shop, 100x150 feet, rising 48 feet and surrounded by a gallery 25 feet in width. The building will be of steel and corrugated iron.

Methods of Mining on the Mother Lode, Cal.*

A policy which obtains throughout the mining districts of California is that of demanding prompt returns from ore development, which is of course very desirable, but which in many cases works ultimately to the disadvantage of the owner, and the manager or superintendent is so completely handicapped that he is unable to make substantial headway. There are certain districts where this demand for "immediate returns" does not act so disadvantageously, but in the mines of the Central Lode it is undoubtedly a short-sighted policy. The reason for this will become apparent when it is understood that with few exceptions the ground is heavy—often swelling and crushing the heaviest timbers. The usual practice is to drive a crosscut or drift from a station at the shaft to the vein. This may or may not at once encounter ore; if not, a drift is driven along the fissure, which must be timbered in the most substantial manner. These drifts are usually not less than 7 feet high, 4 to 5 feet wide at the top, and 7 to 8 feet at the bottom. These dimensions are all inside the timbers. It usually makes little difference whether the cutting is in ore or not, the ground is generally heavy. The fissures are often from 10 to 40 feet wide, and the miners (of Amador county particularly) are well acquainted with the danger, difficulty and expense attending this kind of mining. As soon as pay rock is encountered it is hoisted and sent to the mill, and the drift continues, while overhand stopes are started and development proceeds. It may be several hundred feet to the limit of the property, and is often over 1000 feet, and this heavy swelling—sometimes running—ground must be kept open until the entire level has been explored and the ore to the level above all extracted and sent to the surface. An idea of the character of some of this ground may be gained from the statement that in a certain instance a drift of usual size being driven a distance of 200 feet, at the rate of 5 feet or more daily, under contract, could not be completed before it became necessary to return to that portion first driven for the purpose of retimbering. The timbers employed in holding ground of this character are usually 20 to 30 inches in diameter, and it is no uncommon thing to see these immense logs, a few weeks after being put in place, split, crushed and broken as though they were incapable of offering any resistance to this all but irresistible force.

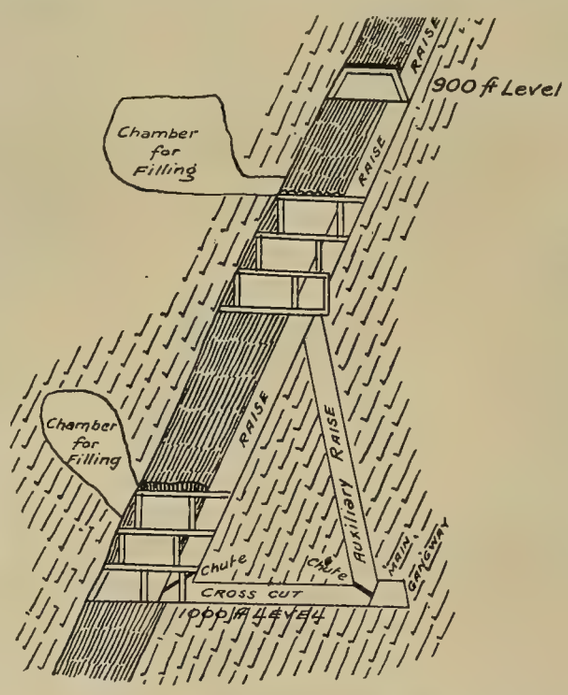
The advisability of cutting the main gangways in the hard rock of the walls, either foot or hanging, and reaching the vein by a system of crosscuts, is advised. This has not as yet, at this writing, been attempted, but its feasibility and desirability can readily be appreciated when the character of the main fissure, as above explained, is understood.

These main gangways, being driven in, say the footwall, should have crosscuts extending at right angles to the direction of the main gangway. These should be disposed at stated intervals for the purpose of prospecting the fissure and to render accessible the ore discovered. In slate, the main gangways should be at a distance of 40 to 60 feet from the vein—where in greenstone they may be driven nearer the vein. The crosscuts should be driven at stated intervals, a greater or less distance apart according to the character of the ground adjacent to the vein. When the ground is very bad, the crosscuts should be closer, and when less so, at longer intervals. In most cases, if driven at intervals of 240 feet, the distance will be found convenient. Raises should always be put through, connecting with the level above, before stoping is commenced. Very often this important matter is neglected, owing, as previously stated, to a desire to realize a profit on the ore as quickly as possible. These raises should be put in about 60 feet apart; this, beginning 30 feet from the point where the crosscut reaches the vein, will admit of four raises within the 240-foot section suggested, the vein being worked 30 feet each side of the raise.

When putting through raises, it is really an economical plan to sink a winze from the level above to meet the raise. By this means ventilation will be more quickly obtained, and the additional work which men can accomplish will soon pay for the increased cost of sinking the winze. Men will not and cannot perform the best work most expeditiously in a foul atmosphere, though the fact seems to be lost sight of by many mine owners.

In addition to the great disadvantage of foul air, when the raises are not put through, the heavy timbers must be hoisted through the raise into the stopes by means of block and tackle at great expense of time. If the raise were through, the cost of handling these great timbers would be very materially reduced by lowering them through the raise from the level above to the floor of the stope where they are to be placed in position.

With the lateral drifts and crosscuts completed, and drifts driven on the vein, with raises through to the next level above, the work of stoping can be carried on at as many points as may be desired, and in a few weeks, or months at most, the greater portion of the excavation made on the vein, where not filled, will collapse and be closed up forever. This works no harm or inconvenience, as the main lateral drift remains open.



Method of Working Veins in Swelling Ground.

When operating in this manner, filling for the stopes may be taken from the hanging wall by driving an inclined raise into it and opening out a chamber. The rock broken in these chambers will pass by gravity down into the stopes beneath and fill them, little or no shoveling being necessary. This method of mining and filling, when properly carried out, will prove safe and far less expensive than some of the methods heretofore employed in California mines. In some mines, if stoping be expeditiously prosecuted in the manner above suggested, no filling will be required, the timbers affording all the support necessary, but in most cases filling of the stopes is advised. Where the hanging wall country adjacent to the vein has a tendency to cave, it may be that the inclined upraise for the purpose of obtaining filling for the stopes may be inexpedient. In that case, a horizontal crosscut may be driven to the solid ground of the hanging, that portion nearest the vein being securely timbered. The filling must then be distributed by means of wheelbarrows.

These filling chambers may be worked with hand or power drills, large or small, as seems desirable. One of the greatest items of mining expense, as now practiced, is that of constantly relieving swelling or running ground, and retimbering. When the ore shoot is attacked in sections by crosscuts from the lateral drift, any particular section need remain open only a few months at most, instead of two, three or more years, as now.

Another advantage may be derived by driving an intermediate level midway between the main levels, if the ground is particularly bad, and connecting with the crosscut or gangway beneath by a raise. In this manner the floor of the lower main level need only be maintained about half the time that would be necessary if all ore were sent down to the main level through a mill hole extending upward 100 feet more or less, and connecting two main levels. The plan would, of necessity, require that a raise be cut through solid rock from the vicinity of the main gangway to the footwall of the vein, reaching it about midway between two levels. Each of these raises would have an approximate height of 40 to 60 feet, and would cost, perhaps, when timbered, $500; but the expense of keeping open the level in the vein would soon offset this expense if the ground were very bad.

As a matter of course, the superintendent must determine when an intermediate level and auxiliary raise are justifiable. His experience with the ground in the fissure will dictate whether the plan suggested is advisable or not. The sketch on this page illustrates the idea.

*Bulletin No. 18 Cal. State Mining Bureau.

High-Pressure Rotary Pumps.

Written for the MINING AND SCIENTIFIC PRESS by JNO. RICHARDS.

There has been a great deal of effort expended in attempts to invent pumping machines of a durable and efficient kind that would have continuous action and produce a constant flow of fluids. The incentives for such effort are many. The weight and cost of pumping machinery of any kind is inversely as the speed at which the fluid passes through it; or in other words, inversely as the volume raised or impelled in a given time. The difference between rotary and reciprocating pumps in this respect is about as five to one. For low pressures and large volumes centrifugal machinery has to a great extent displaced positive or piston machines for fluids of all kinds, but there has been a limitation of pressure that confined pumps of this kind to low heads, and for liquids, to a pressure not exceeding forty pounds per inch. The reasons for this are obscure, and have greatly puzzled scientific people for thirty years past.

Twenty years ago, Emile Bourdon, a celebrated French engineer, produced by centrifugal force combined with impact and tangential energy, water pressure exceeding 1000 pounds per inch, but was by constructive and operative difficulties unable to produce practical machines. Since his experiments it has been well established theoretically, in so far as the kinetic conditions, that there should be no practical limit to the pressure or head against which rotary pumps can operate. Bourdon, Unwin, Rankin, Prof. Reynolds and others have established this mathematically, but were unable to discover the cause of certain cumulative resistances in centrifugal pumping that consumed power without corresponding useful effect. The energy applied to pumps disappeared in some mysterious way; but, strange to say, no one searched for it in the form of heat imparted to the water, and like many other problems of the kind, it was left to be worked out by practical experiments of constructive engineers.

During the past year a practical solution of this subject has been reached by Messrs. Sulzer Bros. of Winterthur, Switzerland, in a works where of all others such a discovery would be most expected. Messrs. Sulzer Bros. stand at this day in the first rank among scientific constructing engineers. For more than twenty years past the firm have given more or less study to rotative pumping machinery, and lately have made this branch a subject of special study and experiment in their works, resulting in more than a dozen installations of free running rotative machines for raising water up to 160 meters (520 feet) and to even greater heads. In one case, at Geneva, 5000 gallons per minute are raised 140 meters (460 feet) with an efficiency of 71% to 72% in water raised, including the losses of the electric motor that drives the pump. An illustration of this is shown in Fig. 1 of the drawings.

The writer of this in 1896 discovered the nature and scope of the resistances that caused a limit of head or pressure in centrifugal pumping and devised a means of evading such losses. Communications and sketches of a proposed solution of this impediment were at the time sent to Prof. John E. Sweet, at Syracuse, New York, and to Mr. Charles Brown, C. E., of Basel, Switzerland; but no practical attempts were made to determine the discovery in practice until the achievement of Messrs. Sulzer Bros. in Switzerland during the past year again brought up this subject.

High-pressure rotative pumps, with nearly all the features of the centrifugal type and operating at a high efficiency, are therefore an accomplished fact. They act by a combination of forces and demand a high grade of workmanship compared to pumps for low pressure. The power applied all appears in water raised, less a minimum of working losses common to pumps of all kinds.

The characteristics of these pumps are: Their original cost for a given duty does not exceed one-third as much as for piston pumps. The space occupied is not more than one-fourth as much, and as there is no jar or vibration, foundations are inexpensive. There is no running contact of the parts, except the spindle bearings, consequently no wear or expense of maintenance, as in piston pumping machinery. There are no valves, no stoppage or reversal of parts, and the flow of water through the pumps is four to six times as rapid as in piston pumps. They are directly adapted for connecting to high-speed motors and engines, consequently dispensing with the usual gearing required to operate crank driven pumps.

Such pumps do not belong in the same class with the common centrifugal type adapted for low pressure; their manner of operating is different, and the construction must be of a much higher grade to withstand their greater speed and pressure.

Pumps of this type are now being made to consume 1000 H. P. and to raise water 800 feet at a pressure of 344 pounds per inch. It is a "revelation," also is a "revolution" in the manner of raising and impelling fluids.

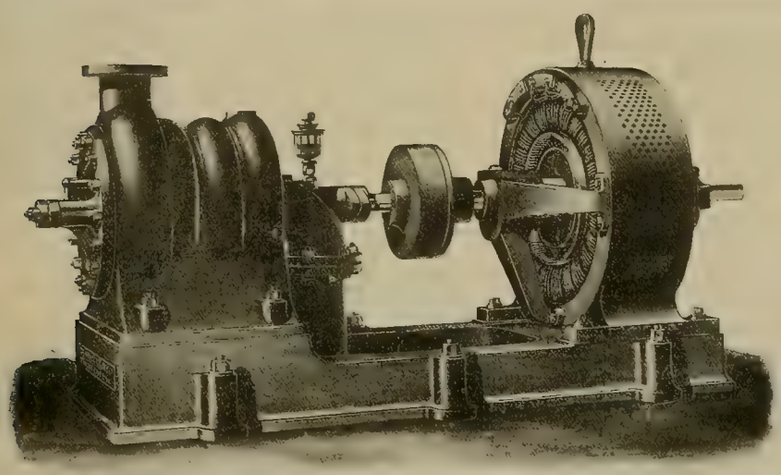


Fig. 1.—Four Stage High Pressure Pump: Sulzer Bros., Winterthur, Switzerland.

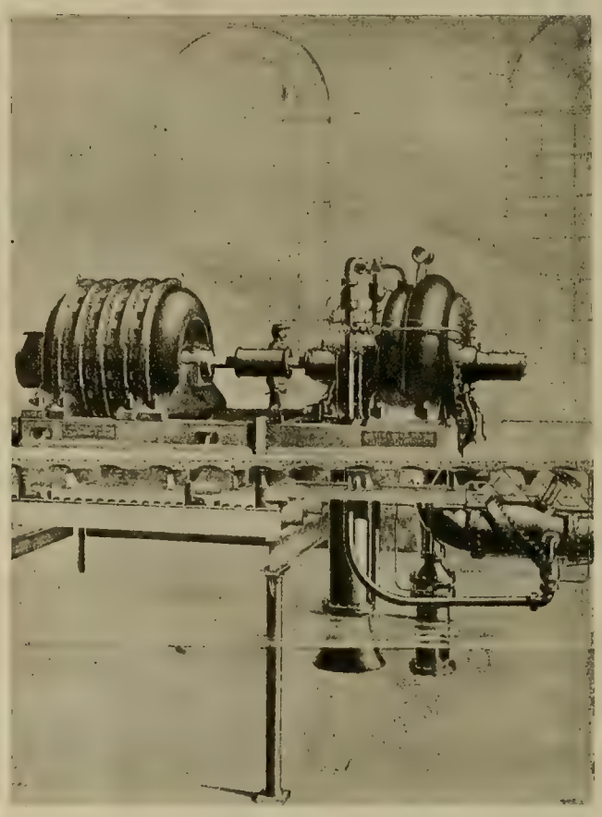


Fig. 2.—Two Stage or Compound Pump: Sulzer Bros., Winterthur, Switzerland.

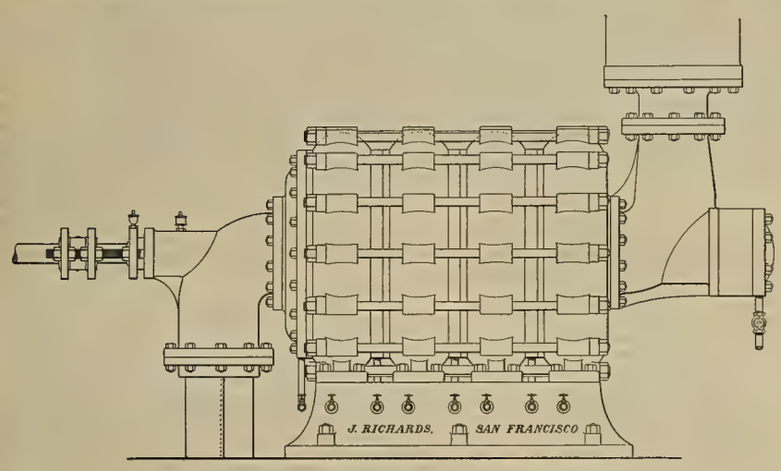


Fig. 3.—Four Stage High Pressure Pump.

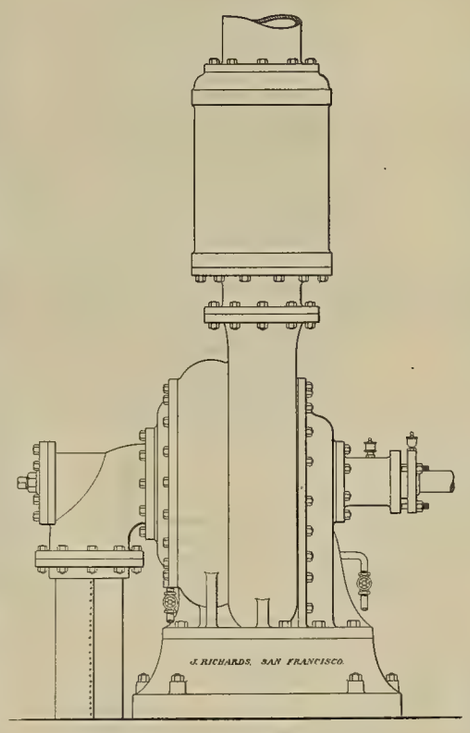


Fig. 4.—Two Stage or Compound Pump.

Head of Water and Miners' Inches.

The following table tells how many miners' inches of water are required to have a certain head of water for a certain size nozzle:

Head feet.	Miners' Inches. 2-in. nozzle.	2½-in.	3-in.	4-in.	5-in.
100	80	125	185	325	500
150	100	155	225	400	625
200	115	180	260	460	715
250	130	200	290	515	800
300	140	220	320	565	880
350	150	240	345	610	950
400	160	255	365	650	1,000

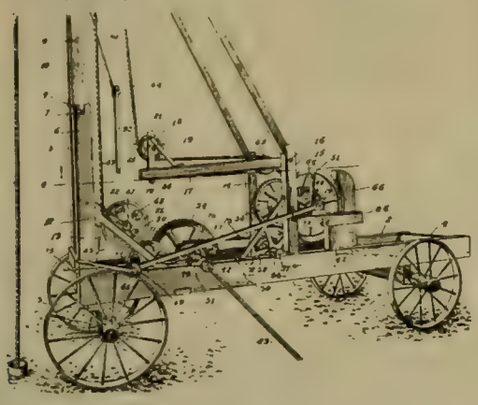
Kindly Colorado Comment.

For the benefit of those who at the beginning of the new year may contemplate subscribing for a scientific mining paper, the Journal will announce that the MINING AND SCIENTIFIC PRESS, of San Francisco, is without a peer among the journals of this class; in other words the best in the world, not the "better."—Telluride, Colo., Journal, Dec. 29, 1900.

Mining and Metallurgical Patents.

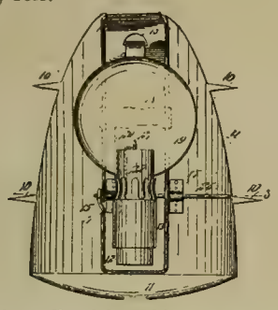
Patents Issued January 1, 1901.

WELL DRILLING MACHINERY.—No. 665,026; G. D. Loomis, Tiffin, Ohio.



Frame including derrick, drill rope passed over pulley, adapted for operative connection with spudding beam pivoted in frame, second beam having fixed relation to spudding beam, rotatable body engaging second beam, adapted to move longitudinally thereof to raise and lower it with varying speeds, pivoted walking beam adapted for operative connection at one side of its pivot with drill rope and at opposite side of its pivot with second beam alternately with operative connection of drill rope with spudding beam, whereby spudding or drilling may be performed with quick down motion and slower up motion without changing direction of rotation of mechanism.

MINER'S CANDLESTICK.—No. 665,067; E. J. Troughton, Victor, Colo.

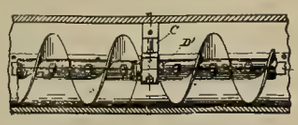


In miners' candlesticks, chimney support consisting of tubular body, apertured horizontal flange at upper portion, rings formed upon upper portion of flange, connected with upper ends of strips, outer ring of upper set having slot formed in lower edge, outer ring of lower set having similar vertically aligning slot in upper edge, transparent sheet of fireproof material passed through slots into spaces between upper and lower rings of chimney support.

PROCESS OF EXTRACTING GOLD AND SILVER FROM ORES.—No. 665,105; J. C. Kessler, Milwaukee, Wis.

Process of separating precious metals from auriferous and argentiferous ores, consisting, first, in subjecting ores to action of an aqueous solution, consisting of cyanide of alkali metal, yellow prussiate of potassium and permanganate of an alkali metal in proportion of water, one thousand parts; yellow prussiate of potassium, two and one-half parts; cyanide of alkali, two and one-half parts; permanganate of potassium, one-tenth part until gold and silver contained in ores are dissolved; second, separating metals from their solution by application of soluble lead salt, by which cyanide solution is decomposed and non-soluble cyanide of lead is formed, at same time non-soluble cyanide of gold or silver is precipitated; third, by application, to sediment thus precipitated, of sodium amalgam, whereby gold, silver and lead amalgam is produced and concentrated solution of cyanide and ferrocyanide of sodium regenerated; fourth, diluting concentrated cyanide solution with water, regenerating and re-energizing aqueous solution for reuse by addition of permanganate of alkali.

SCREW CONVEYOR.—No. 665,262; S. B. Peck, Chicago, Ill., assignor to Link Belt Machinery Co., same place.

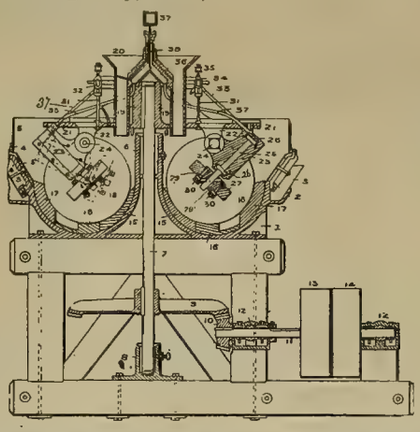


Screw conveying device, combination of containing box normally in horizontal position for conveyance of gritty substances, shaft in containing box, screw blade upon and about shaft, longitudinally split cylindrical-like enlargement removably, but normally rigidly, attached to and surrounding shaft so as to rotate therewith, longitudinally split tube-like bearing part into which cylindrical part fits, support removably attached to top of containing box and connected with tube-like bearing part so as to hold same in position, outer face of cylindrical part snugly fitting inner face of tubular part substantially throughout their lengths, so as to present extended bearing surfaces and to prevent gritty material in which bearing is embedded from entering between these parts.

MINING MACHINE.—No. 665,183; F. J. Crane, Cripple Creek, Colo.

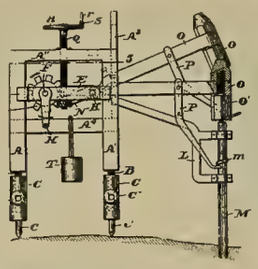
Combination with water tank, of cylinder occupying inclined position in relation to tank and into which it extends at its lower end, cylinder having inwardly projecting flange at lower end, screw within cylinder extending from flange to upper end of cylinder, shorter screw at lower end of cylinder terminating within flight of former screw, screws having perforations therein in parallelism to axis of cylinder, shaft to which cylinder is connected and means for rotating shaft.

ORE GRANULATOR AND PULVERIZER.—No. 665,339; J. M. Montgomery, Butte, Mont.



In ore granulator and pulverizer combination with annular casing, of rotatable head provided with lugs, diagonally disposed bearing boxes adjustably secured to lugs, pusher wheels journaled in boxes, sphere located in casing and adapted to be engaged by pusher wheels and by them chased around casing.

HAND DRILLING MACHINE FOR DRILLING STONE.—No. 665,364; C. M. Engstrom, Ossipee, N. H.



In rock drilling machine, combination with series of hammer helves pivotally mounted, and provided at one end with hammers, of toothed wheels to operate hammers, series of drills having spiral projections on their shanks, surfaces of projections being inclined relatively to axes of drills, series of arms pivoted to hammer helves, their lower ends lying under projections and engaging their lower faces as hammers are raised, whereby drills are partly turned, inclination of spiral projections preventing operative engagement of arms with their upper faces on downward stroke of hammers.

LINING FOR CRUCIBLES.—No. 665,254; W. A. McAdams, New York, N. Y.

A crucible lining composed of powdered fused oxide of manganese and oxide of copper as a binder.

Banka Tin Mines.

On the small islands of Banka and Billiton, east of the southern end of Sumatra, portion of the Dutch possessions, the tin deposits are tested by systematic boring, the sands obtained in these operations being washed and their richness in tinstone determined. Their value thus proved, the tin fields are let to Chinese capitalists on conditions determined by the results obtained in the boring tests. In Banka, the average depth of the pay gravel is 3 feet, and that of the overlying overburden about 30 feet. On the average, a cubic yard of excavation produces about 3.5 pounds of metallic tin. The mines are controlled and largely owned by the Dutch Government. The tin mining is in hands of Chinese, who work the mines, wash the pay gravel and smelt the clean ore in small cylindrical clay furnaces. The tin is sent to Batavia, and thence to Holland, where it is sold by auction. The greatest part of the tin is produced under the auspices of the Billiton Co., which tests the tin lands, and then sublets it to Chinese miners, the Billiton Co. paying the Dutch Government five-eighths of the net profit as royalty.

On the island of Singkep, in the Lingga archipelago, close to Billiton, the deposits are exploited by a Dutch tin mining company, but the actual mining and smelting are in the hands of the Chinese. Since 1897 the tinstone is not smelted in Singkep, but is sent over to Singapore to be smelted by the Straits Trading Co. In Sumatra there are several tin-bearing regions.

The cost of tin production in the island of Banka has averaged about 34 florins per pikul (133.33 lbs.) of tin delivered in store at Java—about $164 per ton—its cost to the Government, exclusive of duty or taxes. At Billiton the cost of tin delivered in Holland, inclusive of the dues paid to the Dutch Government, is about $245.

Notebooks in Underground Work.

Written for the MINING AND SCIENTIFIC PRESS by AUDLEY H. STOW.

Copying notes will usually, in time, be found rather monotonous, as well as expensive, where time has any cash value; a separate notebook or number of pages for each entry, cross entry, level or other working, while a most excellent system where applicable, is still not adapted to many cases, especially extensive workings being rapidly developed, when the entering of the notes, consecutively, in the order in which the surveys are made, becomes imperative.

Hunting up the last notes for any particular place, however, usually consumes time, owing in part to the bad light, the smudge on the pages and the illegibility of notes written in semi-darkness, and often in cramped position. In platting such notes the same difficulty recurs, to a lesser degree. If, however, after returning from work, the names of each particular working be entered, roughly, in indelible red ink, it will be found a grateful relief to the eyes, in the dim, flickering light underground, while saving time—and profanity—and is of nearly equal assistance in plotting. In the cases of rooms off an entry, the number of each may be endorsed in a circle, so that the eye will readily run over widely scattered notes. For instance:

Burns (in red ink)

1.....

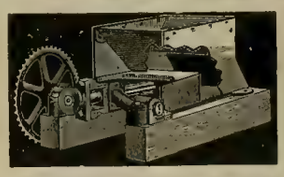
3.....

5.....

Sponge rubber will be found to remove much the larger part of the smudge from the page, without erasing the notes appreciably—provided a sufficiently hard pencil is used—and will sometimes bring out notes plainly which can not otherwise be deciphered.

Triumph Feeder.

The accompanying cut represents the Triumph feeder, manufactured by C. O. Bartlett & Co., Cleveland, Ohio, in three sizes. They claim that it will feed even and regular at all times, and nearly all kinds of material, such as coal, sand, crushed stone, all kinds of ore, sawdust, salt, concentrates, quartz,



phosphates, fertilizers, gypsum, brewers' grain, and all kinds of grain and feed; in fact, will feed any material excepting sticky or adhesive product. The feeder can be regulated to feed slower or faster while in operation, and when set so as to feed a required amount, will do so without variation.

UNITED STATES CONSUL THORNWELL HAYNES, at Rouen, France, says: "Circulars printed in English are a waste of time and money. Circulars come to this office giving the analysis of gas coal, etc. What does a man who talks, writes, speaks and thinks in French know about 'volatile matter' or 'fixed carbon' or 'ash?' A ton of 2240 pounds is as indefinite to a Frenchman as the word 'some' is to an American. Quotations, to receive attention, must be put in French weights and money in the French language."

THE yearly coinage statement of the Director of the Mint shows that the total coinage of the mints of the United States was $137,599,401, as follows: Gold, $99,277,942; silver, $36,295,321; minor coins, $2,031,-138. Of the silver coined $24,960,912 was in standard dollars. The December coinage amounted to $7,758,-580, of which $4,576,697 was gold and $2,288,555 silver and $301,328 minor coins.

Seventh Annual Review of the Lake Superior Copper Industry.*

(Copyright, 1900, by HORACE J. STEVENS)

The year 1900 has been the most prosperous ever known in the Lake Superior copper industry. The production of metal has been practically the same as last year; but earnings have been larger, owing to the maintenance of a uniformly high price for the product of the mines. The number of men employed in the mines was never so great as during 1900, and wages are higher than for a generation past. More millions have been spent in betterments than have ever been so invested in any single twelvemonth before, and the prosperity of the mines has not been confined to the shareholders, but has been generously divided with labor.

The Keweenawan copper-bearing beds of igneous rock stretch from the eastern end of Keweenaw Point, through northern Wisconsin into Minnesota, but the portion of this territory in which active mining is now in progress is about 80 miles in length—from the Washington mine, on the east, to the Victoria mine, lying just west of the Ontonagon river. The eastern end of the active district is in Keweenaw county, and the western portion in Ontonagon county, but the central and more important part of the district is in Houghton county. The growth of mining in Houghton county, the heart of the Lake Superior copper district, is best shown by the following official figures from the annual censuses of mine employes, taken in September of each year, by Capt. Josiah Hall, county mine inspector:

Year.	Number Employes.	Number Fatal Accidents.
1889	6,480	21
1890	7,310	25
1891	7,702	28
1892	7,640	21
1893	7,591	23
1894	7,348	22
1895	7,249	46
1896	8,170	19
1897	8,726	26
1898	10,469	23
1899	13,051	27
1900	13,971	25

The great increase in forces employed is due partly to the opening of new mines and partly to a great increase in the number of men employed by nearly all of the regularly producing mines. The Calumet & Hecla had nearly 7000 men in its employment during the summer of 1900, and proportionate increases have been made by the Tamarack, Quincy, Atlantic and other old mines.

The production of refined copper by Lake Superior mines has been as follows for the past four years:

Year.	Pounds Ingot Copper.
1896	142,057,500
1897	142,702,586
1898	147,965,738
1899	146,950,338

These figures show a falling off of 1,015,400 pounds in 1899. The production of 1900 will not be officially known until the middle of next year, but will show very little change from 1899, with, perhaps, more likelihood of a slight decrease than of an increase. The lack of increase in production, notwithstanding the vast amount of new work under way for the past two years, may appear strange without an explanation. There is no other mining field in the world where so much money and so great a length of time is required for the opening of a new mine as in this district. The experience of the opening of a new mine has shown that three years' time and a half million dollars in cash are the minimum requirements for developing new properties into producing mines. Despite its importance as one of the four mining districts which together supply four-fifths of the world's copper, the Lake Superior field is essentially a low-grade district. The richest mine here—the Calumet & Hecla—carries a trifle less than 3½% ingot copper in its rock, while the Atlantic, at the other end of the list, has paid profits crowding the million mark from rock returning an average of only two-thirds to three-fourths of 1% ingot. The great production and enormous profits of the Lake copper mines are rendered possible only by the existence of regular stratified copper-bearing beds of great width, enormous length, and depth so great that the internal heat of the earth will check the miners long before they have reached the end of paying ground. The development of such metalliferous deposits requires princely fortunes for each new mine, and it will be nearly two years before the influence of the outputs of the new mines is plainly apparent in the figures of production of the district as a whole.

Of the 1900 output of copper, the following-named mines have furnished approximately these quantities:

Mine.	Pounds Ingot Copper.
Calumet & Hecla	85,000,000
Tamarack	20,000,000
Quincy	15,000,000
Osceola	12,000,000
Atlantic	5,000,000
Wolverine	5,000,000
Franklin	4,000,000
Baltic	2,000,000

The Calumet & Hecla has recently stopped work at four of its five shafts on the Osceola amygdaloid. This suspension is due to inability to secure delivery of machinery when promised and lack of milling facilities to treat rock from these shafts before the completion of the new amygdaloid mill at Lake Linden. It is not likely that much work will be done at these shafts before 1902. Work at the Calumet & Hecla proper, on the conglomerate, continues with unabated vigor.

The Tamarack has just bottomed its No. 5 shaft—the greatest undertaking of the sort ever begun. When the first sod was turned for this shaft, on Aug. 7, 1895, Capt. W. E. Parnall, superintendent of the mine, stated that he expected to cut the Calumet conglomerate about Jan. 1, 1901, at a depth of, approximately, 4665 feet. The lode was cut on Dec. 20, 1900, at a depth of 4657 feet—eleven days sooner and at 8 feet less depth than Capt. Parnall's estimate. As there were no diamond drill borings and the shaft was sunk in virgin ground, the exact verification of the preliminary estimates of time and depth are certainly remarkable. The shaft will eventually add about 50% to the productive capacity of the mine, but will not be in full commission until well toward the end of 1901.

The dividend disbursements of Lake Superior copper mines for the past ten years have been as follows:

Year.	Dividends.
1891	$3,540,000
1892	3,260,000
1893	3,520,000
1894	2,380,000
1895	3,280,000
1896	3,985,000
1897	5,431,000
1898	6,853,000
1899	12,318,000
1900	9,798,000

In explanation of the decrease in dividends for 1900 from the high-water figures of the preceding year, it should be stated that the Calumet & Hecla paid dividends of $10,000,000 in the calendar year 1899, though only $8,000,000 has ever been paid by the company during any of its fiscal years, and the dividends of that company for 1900 are $1,000,000 less than they would have been but for a disastrous fire in the mine last May. The dividend disbursements of 1900 by Lake copper mines other than the Calumet & Hecla are much the largest ever known.

The profits returned to shareholders by the copper mines of Lake Superior, to the close of the nineteenth century, have been as follows:

Mine.	Dividends.
Atlantic	$860,000
Cliff	2,518,620
Central	1,970,000
Copper Falls	100,000
Calumet & Hecla	72,850,000
Franklin	1,240,000
Minnesota	1,820,000
National	320,000
Osceola (including Kearsarge)	3,812,500
Pewabic	1,000.000
Phœnix	20,000
Quincy	12,320,000
Ridge	100,000
Tamarack	7,290,000
Wolverine	510,000
Total	$106,731,120

This is a showing equaled by few mining fields in the world. Of the total profits returned to shareholders, the Calumet & Hecla has furnished 68%, the Quincy 11% and the Tamarack 7%. These three mines have made almost 87% of the total profits disbursed by Lake copper mines.

Estimating the market value of the 1900 production of Lake copper at $25,000,000, which is a close approximation to the actual figures, the Lake mines have produced copper during the nineteenth century to the value of $414,117,304. The dividends from this production amount to a fraction more than 25% of the gross value of the output.

The twenty-eight leading copper mining companies of the district had 20,984 shareholders of record on Dec. 31, 1899, the Calumet & Hecla leading with more than 3000 stockholders.

Based on the closing quotations of the Boston Stock Exchange, on Saturday, Dec. 22, 1900—the last session before the Christmas holidays—the market value of the twenty-five leading mining properties of the Lake district was as follows:

Mine.	Market Value.
Adventure	$1,050,000
Allouez	250,000
Arcadian	3,225,000
Arnold	450,000
Atlantic	1,100,000
Baltic	3,100,000
Calumet & Hecla	81,500,000
Centennial	2,150,000
Elm River	550,000
Franklin	1,500,000
Isle Royale	5,700,000
Massachusetts Con	1,350,000
Michigan	500,000
Mohawk	2,350,000
Mayflower	200,000
Old Colony	387,500
Osceola	7,350,000
Quincy	17,400,000
Rhode Island	400,000
Tamarack	19,620,000
Trimountain	2,000,000
Victoria	350,000
Winona	425,000
Wolverine	2,745,000
Wyandot	150,000
Total	$155,802,500

*Condensed.

A Suggested Method.

TO THE EDITOR:—I have the following to offer as a possible solution of the problem mentioned in your issue of Nov. 17th, and will add that I have tried this scheme in a small way with good success. I also suggest, before going to any considerable expense, that some experiments in a small way can be made at small cost and the scheme given a test. Not knowing capacity of the mill, I will say that, supposing it to be a 50-ton mill, I would put in eight wooden tanks, 24 feet diameter, 7 feet high, in two rows of four tanks each, below the mill. The first row next the mill fit up with the usual filter bottom used in a cyanide plant, and on top of the filter put in 2-inch gaspipes about 12 inches apart; bore $\frac{1}{16}$-inch holes in these pipes 3 inches apart. In the second row fit up as above, with the addition of 1 foot of charcoal, with two thicknesses of cheesecloth on top of the charcoal to hold it in place. To operate this plant bring the tailings in launders to the first row of tanks; fill one tank at a time with tailings and water. When one tank is full, turn tailings into another tank, and on the full tank turn on compressed air at fifteen pounds pressure; also, stream of clear water, say, 1-inch pipe, into bottom of tank under the filter bottom, Allow overflow from near top of tank to go into one of the tanks with the charcoal filter. Open a drain hole at bottom of tank and turn on air. The operation of the air and fresh water in the first tank will bring all the fine mineral out and over into the second tank. The water in second tank is filtered out clear without loss of value, unless some values were in solution in the water. If such is the case, it could not be much, and the charcoal would deposit some of it. The second tank is cleaned up when necessary and the product shipped to smelters. About once in six months it may be advisable to clean out the charcoal and burn it, to recover values, etc. The first four tanks should have the usual dumping hole in center of tank, and tanks set high enough to allow a car to pass under. An air compressor of 200 cubic feet per minute is needed. By having eight tanks of capacity mentioned, the operation is continuous. Eight wooden tanks and an air compressor of above capacity does not cost much to install. The only drawback to this scheme is that it is not patented.

Boulder, Colo., Jan. 5.

Dryer for Concentrates.

TO THE EDITOR:—A dryer to be used for drying concentrates is in use here, in which the pipes are placed one above the other, with the loops all occurring at the upper end and none at the lower end, in order that the ore may be shovelled more easily to the car immediately below. The floor can either be made of sheet iron or of flooring, with strips of thin iron fastened down to take the wearing of the shovel. The scheme of the dryer is to utilize the exhaust, if possible, from steam machinery, or, if not possible, to use a boiler for steam and to dry the concentrates by piling them around these steam lines. In practice it works very well. Any number of rows of pipe can be laid as desired; but practically there is no necessity of their being over 2 feet from the floor of the dryer. The number of links in a group would be regulated by the amount of concentrates to be dried per day and the number of groups by the time required to accomplish the desired result on each lot. Then the pipe sections would be so arranged as to supply steam to and drain water condensation from these groups, being used for drying, and to allow those not needed to be cut off by valves. Five links will dry fifteen tons of 60-mesh lead concentrates in twelve hours. The lower end of links are secured by U bolts. This dryer is very simple and can be erected by any one who can handle a wrench.

Aspen, Colo., Jan. 4.

IN 1880 the establishment of the electric industry in the United States began to be of some importance. Seventy-six firms, employing 1271 persons, were then established. Their output was $2,655,036. Ten years later the firms increased to 189, and the number of persons employed to 9485, while the output was $19,114,714. In 1880 there were only three stations in the United States, and only 230 persons were employed at them. In 1890 in New York, the District of Columbia and the city of St. Louis there were 144 electric light and power stations, where 2000 persons were employed, and the output from them was valued at $4,783,224. Four years later, in 1894, there were 2124 central stations in the United State and 7475 separate plants. In 1900 there were 5000 central stations and over 15,000 separate plants.

MINING SUMMARY.

Specially compiled and reported for the MINING AND SCIENTIFIC PRESS.

ALABAMA.

Estimated yield of gold and silver for 1900 is given as $2500 in gold, and twenty-seven ounces of silver.

ALASKA.

A break in the ledge is reported on the 400-foot level of the Apollo mine, on Unga island, rendering necessary the sinking of a new shaft to strike the ore shoot.

ARIZONA.

COCONINO COUNTY.

The Ohio C. M. & Smelt. Co. is shipping ore from its mines in Grand Canyon, near Flagstaff, to Colorado.

GRAHAM COUNTY.

The new plant at the Medler, near Clifton, will be ready April 30th.——W. R. Thompson, fiscal agent Shannon Cop. Co., says that plans are being prepared for a 150-ton concentrator and for a 100-ton smelter to be built near Clifton.——The foundations for the 200-ton concentrator which will go in at the Longfellow, at Clifton, are nearing completion; the plant will be run by gas engines.

MOJAVE COUNTY.

A body of wolframite is found on the Sandy river, near Signal; the property is bonded to A. J. Doran.

YAVAPAI COUNTY.

On the Henrietta, in Big Bug district, the 20-stamp mill is running steadily; $100 ore was recently shipped to the smelter.

CALIFORNIA.

AMADOR COUNTY.

More men will be put on at the War Eagle at Plymouth.

After a shut down for over a year the Cooper and Boom mines, in Oleta district, have resumed.——Operations at the Keystone, Sutter Creek, are going ahead satisfactorily.——Supt. W. H. Storms of the Baliol mine is getting things in shape to keep the forty stamps dropping steadily. He contemplates a new shaft. The present one is down 750 feet. ——Twenty stamps are dropping at the South Eureka.——The cost of mining, milling, development work, including new vertical shaft and expense of running chlorination works at the Kennedy, at Jackson, is estimated at about $5 to the ton.

The East Central Eureka M. Co. has sued the Central Eureka M. Co. for $165,000, the value of ore alleged to have been taken from the plaintiff's mine by the defendant.

The Jackson Con. M. Co., capital $300,000, is organized to work the Pleming, near Jackson, recently bonded to B. A. Ogden.——The Mitchell, at Pine Grove, idle for thirty years, is being worked by Dr. Decker; L. C. Hyner, Supt.; a shaft is being sunk and a 10-stamp mill running steadily.——It is said that $8 per day to the man is being taken out at the Christensen (gravel), near Volcano.

The ditch of the Standard Electric Co. will be 20 miles long, 16 miles being ditch and 4 miles flume. It will be 12 feet wide on top, 6 feet wide on the bottom and 4 feet deep. It will have a fall of 220 feet in the 20 miles. The ditch will empty into a reservoir, from which a 3-inch pipe will lead, giving a head of 1485 feet, or 640 pounds pressure to the square inch. The pipe will run through a tunnel ¾ mile long and down the bank of the Mokelumne river to White's Bar, the site of the power house. Only 5000 inches will be used for the first year.——Chase & Sons Co. are working the Clinton Bar (gravel), near Jackson.

BUTTE COUNTY.

After an idleness of ten years the Cherokee, near Oroville, has resumed; 2500 feet of 22-inch pipe and 1800 feet of 15-inch pipe are going in, and a 600-foot extension of the flume is under way.

CALAVERAS COUNTY.

A $700 pocket was recently opened up on the Rising Sun at Robinson's Ferry.

J. Levaggi, who recently bonded the Acme at West Point, will put in a 5-stamp mill to be operated by water power.

R. Shaw, operating the Courier on Clear creek, near Angels, has driven a tunnel on the property.

A strike of a 6-foot vein of rich ore is reported in the Morning Star.——The shaft at the Ophir, at Carson, is down 320 feet, and drifting both ways is in progress on that level; Supt. Miller.

The Melones Co., at Robinson's Ferry, has forty men working.——The Hexter M. Co., at Mokelumne Hill, has sold 3000 acres of mining land, including buildings, mill, water rights, etc., near Stockton hill, to J. McSorley & Co.; mill is being overhauled and mining operations will begin soon.——C. L. Clark, of San Francisco, leasing the Deep Gulch (quartz), near Mokelumne Hill, has run the tunnel in 115 feet.

COLUSA COUNTY.

The well of the Great Northern Oil Co. at Willows is down over 217 feet; it is expected to strike a strong flow of oil at a depth of 700 feet.

EL DORADO COUNTY.

The restraining dam of the Ralston Divide G. M. Co. at Lynchburg is inspected and pronounced O. K. by the Debris Commissioner, and a permit is granted the company to hydraulic.——A test run was made at the Gopher-Boulder at El Dorado recently and result was sent to owners in San Francisco.

The Emery G. M. Co. has resumed operations on the Gold Hill (gravel), near El Dorado; it is said that $100,000 have been spent in building reservoirs, ditches, flumes, etc., on the property; the company is sinking a shaft on the Live Oak (quartz); drifting will be started on the 200-foot level.——The Shepherd (gravel) is bonded to the Emery G. M. Co.; work will soon begin.——The Ritter, Supt. M. C. Rigney, will start in the spring; a new mill and other improvements will go in.

FRESNO COUNTY.

The Ætna Oil Co. is putting up a new rig near Coalinga.——No. 3 well of the Confidence is nearing completion. Drilling of No. 4 continues.——The Ajax Oil Co. is drilling its first well on 32, 19-15, and is down about 500 feet.——Drilling on the El Capitan, 31, will begin soon.——The Corona, on 32, is down 600 feet.——The Blue Goose Oil Co. has suspended drilling on its first well after reaching a depth of 2000 feet, owing to excess of water. The company will cut off the water, if possible, and resume drilling.——The Home Oil Co. has completed wells 6 and 7. Drilling will begin on No. 8 in a week or ten days. No. 3 is producing 130 barrels of oil per day.——The Coalinga Oil Co. is drilling its No. 10 well.——The Crescent Oil Co. will resume drilling in its first hole.——The Echo will drill on 28, 20-13, in the Grieve oil district. It will begin with a 11⅝-inch hole.——The 36 Oil Co. has bought 36, 19-14.——The Roanoke Oil Co. recently bought forty acres in 36, 19-14 from the 36 Co. and will begin drilling soon.——Drilling will soon be resumed by the Santa Clara. A new rig is going up on No. 1, which is down between 1000 and 1100 feet.

KERN COUNTY.

The Exploration Co. has leased the Garlock mill, Randsburg, and is running it on ore from its mine. Twelve men are employed, eight in the mine and four in the mill; Supt. W. Wilkerson. The tunnel is in 525 feet. Hauling of ore from the mine to the mill, a distance of 1 mile, costs 50 per ton.——The last clean-up of the Butte mine at the Red Dog mill, Randsburg, made Jan. 1st, yielded $4454 from fifty-nine tons, or over $75 to the ton.

The Sunset Oil Co. will begin drilling near Fullerton soon.——The Hopper Canyon Oil Co. is building a road to its property. It is expected to be completed in thirty days.——In Tom's canyon the St. Louis Oil Co. has a rig up and will begin drilling soon.——Well No. 6 of the Buckhorn Oil & Transportation Co. is down 620 feet.——The Wilson Oil Co.'s No. 1, on 4, 29-28, Bakersfield, was recently pumped for three days and it averaged 500 barrels of oil per day.——The McFadyan has put up a new derrick on 7, 28-28. A rig will soon be put in and drilling begun.——The Lion well, southeast quarter of 12, 11-24, Bakersfield, has no oil-bearing sand. The fifty barrels a day comes entirely from the shale. The oil rock is 200 feet in thickness.——The Karl Brown Oil Co. is drilling on 23, 28-27.——The McKittrick Con. Oil Co. has struck oil in its No. 2 well at McKittrick.——The Hercules is down 880 feet on 2, 29-28, Bakersfield.——The Sturgeon Oil Co. is organized to operate on 25, 28-27, Bakersfield.——De Groot & Book are drilling again on 33, 29-21.——The Clyde Oil Co. will begin drilling on 23, 28-27.——The American Oil Co. is putting in new machinery at Tehachapi.——The Chicago Crude Oil Co., on 30, 28-28, has struck oil in its well.

Over 1500 mineral locations and proofs of labor have been filed in the county recorder's office this month. The county recorder collected as fees in one day $1500 for filing new petroleum locations.

LOS ANGELES COUNTY.

The Panamint M. Co., capital $200,000, is incorporated at Los Angeles.——The Organita M. Co., capital $100,000, is incorporated at same place.

MARIPOSA COUNTY.

The annual meeting of the Merced G. M. Co. will be held at Butte, Mont., Jan. 23.

MONO COUNTY.

Manager E. J. Andrews of the Castle Peak, near Bridgeport, reports good progress; the air compressor is working satisfactorily.

NEVADA COUNTY.

Near Graniteville, a ledge of ore is opened up on the Erie; J. L. Gluyas, Supt.——Work on the copper mine at Spenceville has begun.

Operations at the Erie, Eureka, are progressing.

The Providence, at Nevada City, recently shipped three carloads sulphurets to the Selby Smelting & Lead Co., San Francisco.

The Pusbeck mine, near You Bet, is yielding good ore and the 15-stamp mill is in operation.——Work on buildings and machinery at the Lecompton, Nevada City, will begin.

ORANGE COUNTY.

The hole of the Capistrano Oil Co. is down 700 feet into hard sandstone.——The Carbon Canyon Oil Co. will sink its hole to a depth of 1500 feet.

PLACER COUNTY.

A. Brown and others have leased the Baltimore, at Forest Hill, and have begun work.——Excavations for the new mill at the Southern Cross (quartz), near Iowa Hill, are completed; ten stamps will go in first, and ten more later; electric power will be used; R. J. Trimble, Supt.——The new tunnel at the Jupiter (gravel), near Iowa Hill, has cut the channel at a point 260 feet in, cutting off over 1500 feet of tunnel which enters channel at another point; eleven men are working under Supt. Calenberg.

Holman & Williams are working property 6 miles northwest of Colfax; the tunnel will cut the ledge at 240 feet; thirty tons of ore recently shipped to the Selby Smelting & Lead Works, San Francisco, returned $40 to the ton.

PLUMAS COUNTY.

The Hendel-Packer, at La Porte, managed by Packer & Son, is closed down for the winter.——J. H. Thomas has formed a company at La Porte to work the Claybank near there; three shifts are working and a tunnel is being driven.——The new restraining dam in Rabbit creek, near La Porte, being built by C. E. Pike for the La Porte Con. M. Co., is nearly completed.

SHASTA COUNTY.

This week a snowslide on Patterson creek swept away the entire plant of the Sheba M. Co.

SIERRA COUNTY.

A $1500 nugget was recently found on a claim in Lady's canyon, near Downieville, operated by J. Costa and others.

SISKIYOU COUNTY.

The ledge at the Dewey, in Gazelle district, near Yreka, in places has a width of 120 feet.——The Jilson, in Henley district, is said to have produced over $600,000 in the last two years.——Ore from the Polar Bear (copper) at Callahans, is reported to run 20% copper, with gold and silver values.——New machinery is ordered for the Last Chance (gravel), Callahans, and a new dredger is contemplated.——The new mill at the McKeene (quartz) is tested and pronounced satisfactory; men are blocking out ore and production will soon be made.——Good progress is reported at the Spangler (gravel), in Humbug district.——The mill at the North Star (quartz) is running on ore recently extracted.——Hydraulicking is progressing night and day at the Hull Gulch (gravel), in Quartz Valley district.——Good ore is being taken out of the Morrison-Carlock. ——The dredger at the Yreka Creek mines, at Hawkinsville, is temporarily closed down, owing to a scarcity of wood; Supt. Abbott.——A movement is on foot to erect a dredger on McAdams creek.

TRINITY COUNTY.

The new dredger recently built by C. D. Galvin, at Weaverville, was christened the "Undine" Dec. 25, 1900.

TUOLUMNE COUNTY.

The first annual meeting of the reorganized Santa Ysabel G. M. Co. will be held at Pueblo, Colo., Jan. 31, to elect a board of directors and ratify the purchase of the Santa Ysabel G. M. Co. of Wyoming.

The Republican M. Co. has finished its tramway to the Mammoth 10-stamp mill at Sonora, and is hauling ore.

At the Mt. Jefferson, Carters, a shaft is being sunk on Coyote creek for additional water supply; a new pumping plant will go in.

Day & Hunter have bonded the Davies (gravel), 1 mile west of Columbia; they will sink an incline shaft and expect to tap the gravel at a depth of 160 feet; a 4 H. P. engine will go in.——Three shifts are sinking the shaft on the Clio, Jacksonville, now down 300 feet.——The Mohican M. Co., operating the Lillian and North Star mines, on the Tuolumne river, 3½ miles above Ward's Ferry, has run the tunnel on the former in 215 feet, and the one on the latter in 132 feet.——The tunnel on the Riverside, near Carters, is in 400 feet; an additional 100 feet will be run; R. B. Zane, owner.——A good cleanup is reported made at the Little Beauty, Carters.——Work will probably be resumed on the Duffield soon. Four feet of good ore are opened up in the north tunnel.

The new 10-stamp mill at the Hope, at Sonora, was started on the 1st inst.——Lane & Hayward will add ten more stamps to the mill at the Densmore, Columbia.

VENTURA COUNTY.

The Whiddon-Double Oil Co. will put two new rigs in on the Brackin tract, near Santa Paula; No. 4 well, now down 265 feet, is producing twenty-five barrels oil per day; No. 3 well produces twenty barrels oil per day.——No. 2 well of the Santa Paula Oil Co., on the Thompson tract, is down 368 feet; it is expected to run twenty-five barrels oil per day.——Landell, Rowan & Newmark have abandoned their No. 1 well at a depth of 1360 feet; No. 2 will be sunk 500 feet below No. 1.——The Piru Oil Co., on the Bishop tract, are down 125 feet.——No. 1 well of the Aguilla Oil Co. is down 110 feet.——The Home Oil Co., on the Hobson tract, has resumed drilling at a depth of 480 feet.——The Gravity Oil Co., in Timber canyon, is down 780 feet in No. 1.——Oil is reported found in No. 1 well of the Ojai Oil Co. at at a depth of 900 feet.

COLORADO.

ARAPAHOE COUNTY.

The Denver works of the American Smelting & Refining Co., during 1900, produced 362,191 ounces of gold, 8,859,117 ounces of silver, 615,382 pounds of copper and 43,885 tons of lead.

BOULDER COUNTY.

The output of the mines of the county for 1900 was as follows:

Gold	$702,321
Silver	95,358
Lead	1,462
Copper	2,678
Tungsten	7,732
Total for 1900	$809,551
Output for 1899	574,141
Output for 1898	667,328
Output for 1897	568,892

The Moneta M. & M. Co. has work under way on its property near Gold Hill; the tunnel, now in 1000 feet, will be run to the 1200-foot mark, at which point a 4000-foot crosscut will be begun. A. Graves figures ore reserves at 32,307 tons, at $10 per ton; C. E. Dennig, general manager.——On the B. & M., at Ward, the shaft is down 800 feet; two new shafts are being sunk, and the 40-stamp mill is being remodeled; the new shaft-house is completed and a new hoister is in.——The Welcome G. M. Co., operating the Silent Friend, at Sunnyside, has twenty men working; the shaft is down 700 feet.——T. H. Mack, operating the April Fool No. 2 and the Clara Belle, on El Dorado mountain, in Hick's gulch, has opened up a 12-foot vein of $15 ore at a point 115 feet in the tunnel on the Clara Belle.——The Elkhorn tunnel, on Four-Mile, above Salina, operated by Omaha men, will be run 3000 feet into Melvina mountain; it is in 250 feet. Progress is at the rate of 9 feet per day; W. Smith, manager.

CLEAR CREEK COUNTY.

Output of mines of the county for the year 1900 is given at $3,924,025, as follows:

Gold	$1,636,000
Silver	1,970,000
Lead	230,000
Copper	85,000
Zinc	3,025
Total	$3,924,025

The shaft on the Le Roi at Idaho Springs is down 412 feet.

The Yankee Con. M. M. & T. Co., operating the Manhattan tunnel at Yankee, has two shifts working; manager, H. I. Seeman.

EAGLE COUNTY.

Mrs. J. E. Dunn has bought the New York, on Battle mountain, near Red Cliff, and will equip it with necessary machinery and develop it.

FREMONT COUNTY.

The new Rocky Mountain smelter at Florence was fired up and began operations on Dec. 31, 1900.

The output of coal oil from the Florence oil fields for the year 1900 was 1,000,000 barrels.——The new smelter at Florence is temporarily closed down.

GILPIN COUNTY.

Estimated gold and silver production of mines of the county for 1900 is as follows:

Gold	$1,966,060
Silver	202,960
Total	$2,169,020

At the Gilpin mill, Black Hawk, the first section of twenty-five stamps is being overhauled to put in new and deeper mortars, each weighing one ton; a greater

saving of values is expected. Manager Key expects to have mill running Feb. 15th. —— A strike is reported on the Lillian, on Pewabic mountain, Pewabic-Russell district, near Central City. Ore is said to run $70 to the ton.——The Colorado-California Shareholding M. & M. Co. will put in two 40 H. P. gasoline engines at the Crown Point and Virginia mines; 25 tons of ore are being taken out daily; 25 men are employed.

The shaft at the Aududdel, Central City, now down 400 feet, will be sunk to the Newhouse tunnel an additional depth of 1500 feet.——Sinking operations are under way at the Grand Army and Gunnell mines; 100 men are employed.——The Denver & New Haven M. Co. is working over twenty men on the Justice in Lake district. A shipment of fifty tons of ore will be made to the Rocky mountain concentrator at Black Hawk; N. Jones of Russell gulch, Supt.

LAKE COUNTY.

The assessed valuation of mining property at Leadville is given as follows:

Mining property	$461,310
Improvements	440,582
Total	$901,892

The output of the mines at Leadville for the year 1900 is given as follows:

Gold	$2,926,692
Silver	5,455,008
Lead	2,984,344
Copper	732,623
Zinc	715,016
Manganese	73,047
Bismuth	13,000
Total	$12,900,000

Production for 1899 was $9,672,374.

The 1900 output of the American Smelting & Refining Co., at Leadville, is given as follows:

Gold, ounces	99,044
Silver, ounces	4,110,202
Copper, pounds	1,742,813
Lead, tons	21,866

The shaft on the Ohio, Leadville, is down 230 feet; two additional shifts will be put on.——At the Fryer Hill the shaft is down 138 feet.——Sinking is in progress on the Home Extension and the shaft is down a little over 500 feet.——The shaft on the Highland Chief is down 300 feet. ——The Rubie is daily producing twenty tons of sulphide ore, carrying gold, silver and lead; a 400-foot drift will be run to connect the workings of the Yak tunnel.

OURAY COUNTY.

Estimated gold and silver production of the mines of the county for 1900 is as follows:

Gold	$1,694,490
Silver	1,397,862
Total	$3,092,802

The old Iron-Silver, at Leadville, produced over 67,000 tons of ore during 1900. ——The shaft on the Moyer is down 700 feet.——Ore is being shipped from No. 2 shaft of the Chip; daily output, thirty tons.——The old Harrison reduction works will probably be converted into a concentrating mill.

PUEBLO COUNTY.

During 1900 the American Smelting & Refining Co. at Pueblo produced 197,147 ounces of gold, 6,526,309 ounces of silver, 31,862 pounds of copper and 46,440 tons of lead.

SAGUACHE COUNTY.

The Biedell concentrator at Bonanza is sold to the Copper Star M. Co. for $7000. The company will reconstruct the mill to run on ore from the Hanover.——Weems and others of New York are driving a tunnel into Rawley hill, in Rawley gulch, near Bonanza. Three shifts are working.——The Wall recently shipped two cars of ore running about $100 in silver and lead to the ton.——The shaft on the Eagle, now down 200 feet, will be sunk to the 300-foot level.

SAN JUAN COUNTY.

The output of mines of the county for the year 1900 is estimated to be as follows:

Gold	$1,698,800
Silver	1,709,000
Lead	815,116
Copper	261,000
Total	$4,483,916

SAN MIGUEL COUNTY.

Twenty men are working on the Silver Bell at Ophir Loop. —— Work on the Meldrum tunnel at Telluride will probably be resumed soon.——During 1900 the Alta at Telluride has shipped 600 tons of high-grade ore and has concentrated 4000 tons of milling ore at the Gold King mill; 2700 feet of development has been done; level No. 4 is extended 1000 feet; N. J. Mansfield manager.——The tunnel on the St. Julien of the Palmyra group, near Telluride, is in 1000 feet. An additional 1000 feet is being run.

SUMMIT COUNTY.

The 40-stamp mill on the Jessie at Breckenridge, Supt. W. Wilson, will soon bo running.—— The Cashier, Manager Wood, will continue operations through the winter.——The 15-stamp mill of the Gold Bug, in Galena gulch, Manager J. Olson, is running steadily on ore from that mine.——Sinking on the Arkansas, on Gold hill, in Kokomo district, is in progress.——A new plant is going in on the Sunday (iron), recently leased by Leadville men.——The shaft at the Breene is going down steadily. Twenty-seven men are employed.——Manager Ingersoll of the Wintergreen is pumpiug out the mine. Operations will continue through the winter.—— The Michigan is again running.

TELLER COUNTY.

The following table shows dividends paid by mines of Cripple Creek during the year 1900:

Stratton's Independence	$1,226,000
Isabella	180,000
Lillie	130,000
Raven	40,000
Amazon	102,000
Gold Coin	240,000
Consolidated mines	120,000
Modoc	60,000
Golden Cycle	120,000
Last Dollar	60,000
Strong	300,000
Independence T. & M. Co	112,500
Elkton	33,750
Elkton Con. G. M. Co	225,000
Mary McKinney	150,000
Favorite G. M. Co	48,000
Touraine	77,000
Amanda	6,000
Greater Gold Belt	76,000
Omega	18,187
Lake City Leasing Co	3,875
Santa Rita	4,000
Southern Boy	17,500
Anderson G. M. Co	15,000
Acacia	45,000
Specimen	153,037
Buckeye	160,000
Magnolia	187,000
Big Four	14,500
Gold Belt Int. Co	112,500
Union	312,500
Temomj	250,000
Six Points	120,000
Con. Nighthawk & Nightingale	180,000
Kittie M. Leasing Co	1,500
Monarch	120,000
Cripple Creek Con	160,000
Gold Deposit	10,000
Zoe G. M. Co	7,500
Bull Hill Con	15,000
Midget	120,000
Portland G. M. Co	750,000
Vindicator	189,540
Gold King	118,105
Granite	60,000
Total dividends in 1900	$6,450,994

During 1900 the samplers in the Cripple Creek district handled 211,731 tons of ore, valued at $11,156,261.80, divided as follows:

	Tons.	Value.
Rio Grande	81,231	$3,005,261 80
Taylor & Brunton	60,000	4,500,000 00
Cripple Creek S. Co.	63,000	3,276,000 00
Eagle	7,500	375,000 00
Totals	211,731	$11,156,261 80

The output of the mills and smelters of Cripple Creek for the month of December, 1900, is given as follows:

Mills.	Tons.	Value.
Colo.-Philadelphia	9,500	$373,000
Bimetallic	9,300	230,000
National	4,100	145,000
Economic	3,000	90,000
El Paso	3,500	88,000
Arequa	1,900	65,000
Smelters	13,000	1,010,000
Totals	44,300	$2,001,000

The shaft on the Indicator, at Victor, is down 100 feet, and crosscutting is in progress at that depth.——The Unexpected, at Windy Point, is abandoned.——Standard & Co., operating on Block No. 3 of the Mountain Beauty, at Victor, recently shipped fifteen tons of ore, ranging in value from $150 to $1200 to the ton.——Sinking on the Bonnie Nell is temporarily suspended on the 300-foot level; a crosscut is being run at the 250-foot level.

GEORGIA.

During 1900 the estimated yield of gold and silver is as follows:

Gold, value	$120,165
Silver, ounces	165

IDAHO.

BLAINE COUNTY.

F. R. Reed, representing New York men, has bought the Liberal group, 28 miles northwest of Hailey; thirty men will be put on and development begun.

A 13-foot ledge, high-grade gold-copper ore, is opened up on the 500-foot level of the Tiptop, at Hailey.——The Minnie Moore M. Co., Ltd., capital $500,000, is incorporated at Hailey.

Work on the Minnie Moore, at Broadford, will be resumed shortly; about twenty men will be put on; shaft will be retimbered.

CUSTER COUNTY.

Enough ore is said to be blocked out at the Lucky Boy, at Custer City, to keop the 80-ton mill supplied for the next three years.

The Black group, recently sold to Philadelphia men, has a 10-stamp mill; a cyanide plant will be added during the winter.

FREMONT COUNTY.

The dredger of the Heintz Gold Extraction Co., operating on the Snake river, near La Belle, was burned on the 28th ult.; loss, $15,000; it will be rebuilt; the dredger had a capacity of 1000 tons per day; Supt., J. K. Korty.

IDAHO COUNTY.

The shaft on the Big Buffalo group, at Buffalo, is down 200 feet; mill is running steadily.

OWYHEE COUNTY.

Supt. J. Russell of the Pauper at Silver City will start drifting. The shaft is down 500 feet.

SHOSHONE COUNTY.

During 1900 shipments of ore from the Cœur d'Alene mines increased from 12,000 tons in January to 15,000 tons during December; 2200 men were employed at the beginning of the year. About 3500 were working in mines, mills, etc., at the close of December, entailing a payroll of nearly $12,000 per day.

During 1900 the daily output of the Morning M. Co. at Wallace has increased from 800 tons to 1000.

No. 5 tunnel in the Keep Cool, Lake Pend d'Oreille district, is in 310 feet; recently a vein of ore 18 inches wide was opened up; samples run $28 to the ton in silver, lead and gold.

The tunnel on the Headlight at Wallace is in 400 feet. Progress is at the rate of about 100 feet per month.

MARYLAND.

The estimated gold yield of the State for 1900 is $186.

MICHIGAN.

During the year 1900 the yield of gold and silver is given as follows:

Gold, value	$207
Silver, ounces	13,100

MISSOURI.

JASPER COUNTY.

The zinc and lead production of the county for the year 1900 is given as $5,339,629.

MONTANA.

Director of the Mint Roberts estimates the gold and silver yield of the State for 1900 as follows:

Gold, value	$5,126,615
Silver, ounces	16,750,000

LEWIS AND CLARKE COUNTY.

The Spotted Horse, near Helena, is bonded to Cahill, Johnson, Head & Clarke; development on a large scale will begin shortly.

MADISON COUNTY.

Gilbert & Parker are sacking ore for shipment at the White Pine, near Pony. ——Ore from the Pony, at Pony, is said to run $200 to the ton.——The tunnel on the Noble, on Wisconsin creek, near Sheridan, is in 2000 feet; it taps the lead on the incline at a depth of 1400 feet; a 600-foot upraise is run from the tunnel, and will be driven additional 400 feet to secure perfect ventilation; ore is shipped to the Colorado smelter at Butte.——Operations on the Klondike, near the Noble, will begin soon. ——The Wisconsin creek placers have closed down for the season.

An assessment of 3 mills on the dollar is levied by the Centennial Toledo G. S. L. & C. M. & M. Co. of Sheridan.——Good ore is taken from the Single Standard on Wisconsin creek.——The mill at the Germania is running steadily.

MEAGHER COUNTY.

The shaft on the Silver Belt at Neihart, now down 50 feet, will be sunk an additional 50 feet; a crosscut tunnel is being run.

MISSOULA COUNTY.

The Aladdin group and other claims in the Wallace district, near Missoula, are bonded to New York men.

PARK COUNTY.

A. Livington, who recently leased the Revenue mill at Jardine, has bonded the Robinson mine at that place.

SILVERBOW COUNTY.

The lowest depth attained in the Butte district is 2200 feet at the High Ore, Diamond and Green Mountain of the Anaconda Co.——During the year 6700 feet of sinking have been done in the district.——The shaft on the Pennsylvania is down 1400 feet.——On the Parrot the shaft is down 1600 feet.——Total depth of all shafts in Butte district is 47,890 feet.

NEVADA.

LANDER COUNTY.

Work on the Thorpe group (antimony), 7 miles south of Austin, is going ahead; a new hoist went in some time ago, and the main incline is now down 250 feet; a crosscut will be run, and three 8-hour shifts will be put on. Should development be satisfactory reduction works may be put in this spring; J. Thorpe & Son & J. G. P. Stokes, owners.

LINCOLN COUNTY.

C. M. Over is shipping a car of copper ore from the January mine. H. White, S. Yount and J. N. Hale have bonded their interest in the Columbia and Boss mines to J. R. Walker et al, of Salt Lake, Utah. The latter has also bonded the Double-Up mine. These are all copper properties. Work has been resumed on the Green Monster; Supt., J. Wilkinson.

Goodsprings, Jan. 3.

ORMSBY COUNTY.

Drilling for oil will begin at Carson.

STOREY COUNTY.

Crosscut No. 2 on the 1000-foot level of the Caledonia, Virginia, is extended 76 feet.——Ten cars of ore recently taken from the 900-foot level of the Overman, ran $18.03, of which $10.10 was gold.

During week ending January 5th the Con. California and Virginia, Virginia, shipped 39,090 pounds of concentrates to the Selby Smelting & Lead Works, San Francisco.——The blower in the central tunnel of the Ophir is now run by electric power furnished by the Truckee River General Electric Co.——The Hale & Norcross tunnel is in 1952 feet.——Ore from the 425-foot level of the Gould & Curry recently shipped assayed $4.90 (coin) per ton.

WASHOE COUNTY.

Supt. Scidmore, of the E. M. & R. Co., Reno, will put on men and start up operations at the mines soon; the smelter will also resume.

WHITE PINE COUNTY.

On the Pilot Knob, Morris and Jupiter groups, near Ely, three shafts are being sunk.——The new plant on the Robust will be running January 31st; mill has daily crushing capacity of 100 tons; a strike of $100 ore is reported.

The new mill of the New Chainman M. Co. at Ely is to be enlarged to 125 tons daily capacity; a new building, 36x125 feet, will be put up; steam power now used will probably be replaced by electric power soon; shoots are being cut from the 200-foot level to ore bodies on the 150 foot and 100 foot levels.

NEW MEXICO.

The gold and silver output of the Territory for 1900 is given as follows:

Gold, value	$900,000
Silver, ounces	600,000

GRANT COUNTY.

J. A. Cerillos has bonded the Lord Nelson at Central; new machinery will be put in and development work begun.——The new amalgamating mill of the Wilson M. Co., going in on the Volcano in Stein's Pass district, is nearing completion; a 5-mile pipe line is going in.——On the Maggie M. a horse-whim is in over No. 3 shaft, which is 70 feet deep; shipments of 100 tons of ore weekly will soon begin.——At Red Rock the main shaft of the Alesandro M. Co. is down 100 feet; another shaft is started; sixteen men are employed; regular shipments of ore are being made. ——Barksdale & Burnett have leased the Copper Queen at Pinos Altos and are now working the same.

SANTA FE COUNTY.

The Santa Fe G. & C. Co. has bought coal lands near Ortiz station for $7900.

Giltner & Van Horn will put up a mill on property in the Sandia mountains, south of Cerillos.

SOCORRO COUNTY.

Gems resembling diamonds are reported found near Capitan, 80 miles north of Alamo Gordo, by J. J. Blow, formerly connected with the Consolidated Co. at Kimberley, South Africa.

TAOS COUNTY.

Supt. Sewall has work well under way on the McGinnity, near Red River.——New machinery is going in at the Black Copper.——J. Moad and others will work the Esther at Red River. The ore is lead, copper and gold.——The new mill recently put in on the June Bug will begin treating ore soon.——Work is progressing satisfactorily on the Golden Treasury.——The Copper King is shut down for repairs.

NORTH CAROLINA.

The estimated gold and silver produc-

tion of the State for 1900 is given as follows:

Gold, value	$51,018
Silver, ounces	13,092

OREGON.

BAKER COUNTY.

C. Bonner of Butte, Mont., has a contract for running a 600-foot tunnel on the Diadem, in the Greenhorns, near Sumpter, to be completed in five months.

Tunneling is in progress on the Harth (quartz) at Galice.——Work on the Gold King and Ruster (quartz) mines on Forest creek is resumed.——A. B. Cousin is pushing work on his hydraulic mine on Galice creek, near Galice.——A. Dean is working the Dean (placer) on Rogue river. An additional water supply will be obtained from Centennial gulch.

Work on the Baisley-Elkhorn, near Baker City, is resumed; the two Bryan mills are running; shaft is down 550 feet; C. E. Whitaker, Supt.——A new mill will go in on the Chloride next spring.——The shaft on the Copper Queen, now down 35 feet, will be sunk to the 100-foot level.——The new 10-stamp mill at the Columbia, in the Cracker creek district, is about completed.——The new 1½-mile tramway at the North Pole is nearing completion and will supply the mill with about ten tons of ore per hour.——It is reported that the mill at the E. & E. may soon resume.——A 500-foot tunnel is being run on the Colorado.——Work on the Venus group is going ahead.——At the Minneapolis, near Bourne, a tunnel is being driven; it is in 85 feet.

CURRY COUNTY.

Bodley & Co. are shipping twenty tons of ore from their property at Mule mountain, near Gold Beach, for a test; if results are satisfactory a mill will be put in.——Muncey & Wright have run the tunnel in 145 feet on the McKinley group, near Gold Beach, and have opened up copper ore.

JOSEPHINE COUNTY.

Ore is being taken out at the Copper Stain at Leland.

SOUTH CAROLINA.

The gold and silver yield of the State for 1900 is estimated as follows:

Gold, value	$122,625
Silver, ounces	395

SOUTH DAKOTA.

The estimated yield of gold and silver of the State for 1900 is as follows:

Gold, value	$6,617,676
Silver, ounces	280,000

CUSTER COUNTY.

The Grand Junction, near Custer, is reported sold to New York men for $200,000.

LAWRENCE COUNTY.

According to the mine inspector's report, the metal production of the Black Hills for 1900 is:

Gold	$10,000,000
Silver	300,000
Wolfram	50,000
Spodumene	25,000
Copper	15,000
Lead	10,000
Mica	10,000
Paint pigments	5,000
Tin	3,000
Total	$10,418,000

During the same period there were 4500 men employed, entailing a payroll for the year of about $5,670,000.

A strike of rich ore is reported on the Dakota Maid, in Bear Butte district, near Deadwood; assays are said to run $500 to the ton.——The old Caledonia stamp mill, which has lain idle for ten years, is again in operation. A deal is said to be on foot for the sale of all the mining groups on Lead hill, at North Lead, including the Grantz, Harrison, Durango, Iowa, Golden Crown and others. Should the deal go through, it is likely that plants will be put in and development begun on a large scale.——The Denver-Black Hills M. M. & D. Co. is organized to work the Cora, in Galena district; the stamp mill on the property is being repaired.——The Homestake Co. at Lead is putting two old mills in shape to run, which, with the four already in operation, will give a total of 840 stamps dropping, with a capacity of nearly 3800 tons per day. Plans are on foot, it is said, to increase the number of stamps to 1000; 950-pound stamps are used. The deepest shaft is down 1700 feet. Most of the ore being worked at the present time comes from the 500 and 600 foot levels; 2000 men are employed, with a payroll amounting to $200,000 per month. The new hoisting plant furnished by the Union Iron Works of San Francisco is about in; it has a capacity for sinking to a depth of 3000 feet; Gen. Supt., T. J. Grier.

The Clover Leaf M. Co., operating the Uncle Sam at Perry, has started up its 20-stamp mill on ore from that mine; N. Trewick manager.——A strike is reported on property of the Gladiator G. M. Co., operating on the Homestake belt, near Deadwood.

PENNINGTON COUNTY.

The Elizabeth M. Co., operating the Bismarck, at Keystone, is experimenting with the cyanide process on ores from that mine.——On the Chilkoot, 4 miles northwest of Keystone, ore running $400 to the ton is reported opened up.——The Crown Hill M. Co. will enlarge its fifty-ton concentrating plant at Keystone to 100 tons daily capacity; the shaft on the Crown Hill, now down 300 feet, will be sunk an additional 200 feet.——The spodumene property near Keystone is reported sold to New York men for $6000; a contract is let to ship 500 tons of spodumene ore, from which lithia water is extracted to New York.

TEXAS.

Estimated yield of gold and silver of the State for 1900 is as follows:

Gold, value	$7,000
Silver, ounces	500,000

TENNESSEE.

During 1900 the State produced $206 in gold and one ounce of silver.

UTAH.

IRON COUNTY.

The Stateline mining district is 75 miles southwest of Milford, 65 miles west of Cedar City, 17 miles west of Modena, the nearest shipping point on the Utah & Pac. R. R., 2 miles east of the Nevada State line, 85 miles northeast of DeLamar and 35 miles east of Pioche, Nev.——A 5-foot vein of ore is opened at a depth of 153 feet in the Aggie; shaft is down 170 feet.

JUAB COUNTY.

At the Lower Mammoth, at Tintic, the machinery is being overhauled and work in the mine is suspended; ore bins are nearing completion.

In the suit of the Mammoth vs. the Grand Central, Tintic, decision is rendered in favor of the latter.

Work is in progress on the Iron Cap, near Mountain Home.

The La Reine M. Co. has increased its capital stock from 250,000 shares to 300,000 shares at $1 each.——Pending suit between the Four Aces and the Swansea, at Silver City, the former has laid off all but four men; Supt. Lee.——An assessment of ½ cent per share is levied by the Pic Nic M. Co. of Silver City.——A tunnel is being run from the 600-foot level of the El Rey to tap the Sunbeam vein at a depth of about 1000 feet.——The construction of the new concentrator to go in on the Tesora, at Tintic, will begin soon.

The Shoebridge Bonanza, at Diamond, Tintic distrrict, Manager Heffron, made a shipment of ore recently that ran 10% copper, twenty ounces silver, 10% lead and about $1 in gold to the ton.——Samplings of the ore from the Tesora, at Tintic, to date, show an average of 10% copper, with gold and silver of about $9 to the ton; output of ore is about one carload per day.

Driving the 800-foot level in the Lower Mammoth, at Tintic, is in progress.

The output of the Godiva, at Tintic, for 1900 was 4900 tons of ore, that averaged twenty-three ounces silver, 20% lead and 60 cents gold per ton.

The Sioux-Ajax Co., at Tintic, will begin operations.——Supt. Watson of the Eureka Hill has men extracting ore; more men will be put on.——Ore from the strike recently made on the 600-foot level of the Mammoth is said to run 9000 ounces silver to the ton; another strike is reported made on the 1800-foot level.

The Lower Mammoth, at Tintic, is shipping ore; the new air compressor will be in place in February.

MILLARD COUNTY.

The Orizaba M. Co., F. E. Bostwick manager, is sinking a shaft on the Orizaba, 6 miles from Smith's Station, on the Oregon Short Line; samples of ore show 10% copper, seventeen ounces silver and a small amount of gold to the ton.

SALT LAKE COUNTY.

Ore recently opened up on the 400-foot level of the Silver Cord, at Bingham, runs 32% copper and $240 gold to the ton.——The Mayflower M. Co. of Bingham has levied an assessment of ½ cent per share—$2000.——An assessment of ¼ cent per share was levied on the 5th inst. by the Gonyon M. Co., delinquent Feb. 5.

The Bingham C. & G. Smelter, Bingham, will start up on a trial run on the 15th inst.

The Shawmut M. Co., Bingham, Manager W. B. Andrew, recently issued $50,000 bonds for development purposes.——Manager T. R. Jones of the Mingo smelter at Sandy, which closed down recently, states that it will resume operations next month.——T. Pells is shipping silver, lead and copper ore from the Rough Rustler at Bingham; three tunnels, with a total length of 500 feet, are run on the property.——Assays of ore from the Erie, in Markham gulch, near Bingham, now being operated by R. Palmer, give 20% lead, 17% copper and 13 ounces of silver to the ton.

The Dewey Con. C. & G. M. Co., capital $30,000, is incorporated to work the Dewey group of five claims at Bingham; group was bought recently for $25,000; A. L. Morris, manager.——Two cars of ore recently shipped from the Red Wing, Bingham, returned $30.96 net per ton.——Peters & Leland, representing Eastern men, are reported to have bonded the Turngren at Bingham for $100,000.——At a special meeting of the Shawmut M. Co. of Bingham the recent issue of $50,000 in 7% five-year bonds was ratified.——Title to all former holdings of the New Mammoth M. Co. at Bingham, consisting of six claims and an up-to-date mill, has passed into the hands of President F. Knox of the National Bank of the Republic, Bingham.

The Highland Boy, Bingham, during 1900 produced 5,809,886 pounds of copper, gold and silver bullion, valued at $1,278,174.92.

Two cars of ore were recently shipped from the Mammoth at Bingham, from which it is expected returns will be $16,000.——Supt. Mayberry has seventy-five men working at the United States, Bingham.

SUMMIT COUNTY.

At the Mackintosh sampler, at Park City, 73,003 tons of ore were treated during the year 1900, amounts of ore from various mines being as follows:

	Tons.
Crescent	19
Valeo	294
Apex	631
Anchor	7,376
Ontario	5,749
Daly-West	25,356
Silver King	33,578
Total	73,003

A new boiler is going in at the Daly-West at Park City, and the mill is being enlarged to treat thirty tons of ore additional per day; a winze is being sunk from the 1400-foot level; Supt. Kirby.

There are about 200 men employed in the mills at Park City.

TOOELE COUNTY.

The Bunker Hill at Stockton is shipping ore to Salt Lake.——The new roaster at the Sacramento, Mercur, will start up Feb. 1.

The mill at the West Argent, at Stockton, Manager Jacobson, is running.

UINTA COUNTY.

Fifteen gilsonite claims near Vernal were recently sold to S. Johnson of St. Louis, Mo., for $3500.

VIRGINIA.

Estimated yield of gold and silver of the State for 1900 is given as follows:

Gold, value	$3,534
Silver, ounces	285

WASHINGTON.

Director of the Mint Roberts estimates gold and silver yield of the State for 1900 as follows:

Gold, value	$826,873
Silver, ounces	300,000

FERRY COUNTY.

The ledge on the Elk on Toroda creek, near Bodie, is said to be from 6 to 10 feet wide.——The tunnel on the Bodie is driven 374 feet; ledge is expected to be cut at about the 400-foot mark; shaft is down 26 feet.——The old tunnel on the Oxford is being extended.——The two-compartment shaft on the Mountain Lion, Republic, now down 450 feet, will probably go an additional 200 feet.——Operations on the Iconoclast, at Keller, will resume in March.——McMaster & Kinney are sinking a shaft on the Cash, west of the Gold Cord.

KING COUNTY.

The receipts of gold and silver at the U. S. Assay office in Seattle during 1900 were 46¼ tons; total quantity of gold for the year was 1,345,122.41 troy ounces, with an assayed value of $22,038,755.12, representing the individual deposits of 7106 persons.

OKANOGAN COUNTY.

Mazama is a new postoffice at the mouth of Goat creek, 13 miles up the Methow river from Winthrop. Barron is a postoffice at Slate creek, 24 miles up the river from Mazama. Slate creek has two stamp mills working successfully on good ore. In the immediate vicinity of Mazama there are a number of gold and copper properties now under development. The most prominent are the Dry Tree G. M. Co., Goat Creek M. Co., Methow G. M. Co., T. & B. M. Co. and American Flag M. Co.

Mazama, Jan. 3.

YAKIMA COUNTY.

There are about 200 claims in the Summit district, near North Yakima, and about 75 men are employed on them.

WYOMING.

Estimated mineral output of Wyoming for 1900 is given as follows:

Coal	$4,000,000 00
Gold	1,198,246 20
Copper	1,009,346 90
Iron	440,651 17
Silver	61,004 86
Total	$6,709,243 13

Annual output of coal is said to be 3,500,000 tons.

The gold yield of the State for the year 1900 is given as $24,806.

CARBON COUNTY.

The shaft on the Rudefeha of the Ferris-Haggerty, at Grand Encampment, now down 250 feet, will be sunk to the 500-foot level; ore is shipped overland in wagons 60 miles to Walcott, on the Union Pacific, and from there to Denver by rail; wagon freight alone runs from $10 to $15 to the ton.

FOREIGN.

The Onondaga M. Co., operating a group of nine claims at the head of Champion creek, near Waterloo station, on the Nelson & Ft. Sheppard Railway, has thirty men working. A new stamp mill is going in. A 4-mile tramway may be put in.——A strike is reported made in No. 5 tunnel of the Ruth at Sandon.——The Paradise, Northeast Kootenay, Manager Bruce, in seven months has shipped 1000 tons of ore. No. 4 tunnel is now in 300 feet. An upraise will be run from No. 4 tunnel to the bottom of the incline of No. 2 tunnel.——At New Denver work will begin on the Molly Hughes group soon.——The Hartney, 3 miles southeast of New Denver, will begin shipping ore.——A strike of good ore is made on the 250-foot level of the Brooklyn at Phœnix.——A strike is also reported made on the 200-foot level of the Stemwinder.——Shipments of ore from the mines in the Boundary district, near Phœnix, for the year 1900 are given as 103,723 tons.——Work on the Neglected, near New Denver, is resumed.——The May & Jennie, on Forty-nine creek, 8 miles from Nelson, recently bonded to the United Mines, Ltd., a French company, represented by J. J. Fleutot of Nelson, is under development. A 10-stamp mill will be put in.——One hundred additional men were put on at the War Eagle, Rossland, last week. After a cessation of nine months shipments of ore were resumed recently. One hundred tons of ore daily are shipped from the 250-foot level.——During the week ending January 5 the following shipments of ore from the mines at Rossland were made:

	Tons.
Le Roi	2,800
Center Star	1,080
War Eagle	210
Le Roi No. 2	157
Iron Mask	135
Total	4,382

The 18-drill compressor plant is going in on the Velvet.——A spur from the Red Mountain line to the Velvet, Douglas and other mines on Sophie mountain will be run up Sheep Creek valley, 9 miles. When completed, ores from these mines will be sent to the Northport, Wash., smelter.——The work of enlarging the Granby smelter at Grand Forks will begin April 1.——It is estimated that the mines at Rossland will turn out 600,000 tons of ore during the year 1901, of a gross value of $8,000,000.

During the week ending Dec. 29th, 4186 tons of ore from the Knob Hill, Victoria and Old Ironsides mines, at Grand Forks, were treated by the Granby smelter.——A project is reported on foot to run a tunnel from Silverton to Sandon, a distance of 6 miles.

A payment of $25,000 is made on the Utica group at Kaslo.——Near Crow's Nest Pass, 276,000 acres of coal lands, belonging to the Crow's Nest Pass Coal Co., are reported sold to the Great Northern Railway Co. for $5,000,000; the company will build a road to the fields, it is said.

The output of the mines at Rossland for the year 1900 amounted to 221,902 tons (approximately)—an estimated value of $3,500,000.

On the Nettie L., Lardeau, the new winze in the crosscut is down 60 feet; the output of ore is ten tons daily. A tunnel is being driven on the M. & V. group, on Twelve-Mile creek, near Nelson.——Lade & Ferguson, operating the Truine, recently shipped eighty tons of ore to the Trail smelter, returns from which were as follows:

Gold, 71.28 oz., at $20.67 ℔ oz.	$ 1,473 36
Silver, 24,470.07 oz. at 62c ℔ oz.	15,171 44
Lead, 73,468 lbs. at $4 ℔ 100 lbs.	2,938 72
Total	$19,583 52

The War Eagle at Rossland is shipping ore from the 250-foot level to the Trail smelter.——Shipments of ore from the

mines at Rossland amount to 9000 tons per week. During the week ending Dec. 29th shipments of ore from the mines at Rossland were as follows: Le Roi, 2072 tons; Centre Star, 1800; Le Roi No. 2, 75; Iron Mask, 175; Giant, 43; I. X. L., 25. Total, 4190 tons.——The shaft in the Le Roi No. 2, now down 600 feet, will be sunk an additional 200 feet.——Work on the foundation for the new compressor for the Rossland Great Western is progressing; shaft is down 700 feet.——Sinking is in progress on the Columbia and Kootenay at Kootenay.——The I. X. L. is shipping ore.

At the Knob Hill, Phœnix, a cut from 250 to 350 feet wide will be made into the mountain a distance of 2400 feet.——The Old Ironsides workings are connected with a 200-foot winze sunk from a point 800 feet inside of the tunnel. Two hundred and fifty men are employed.——The stamp mill at the Chapleau, Slocan, is treating twenty-five tons of ore daily.——More men have been put on at the Standard, on Republic hill.——The Evening Star group, on Dayton creek, will be opened up again soon.——Work is in progress on the Morning Star, on Springer creek.——H. L. Frank of Butte, Mont., has bought 2560 acres of coal land near Lethbridge.——The Lake Shore C. M. & D. Co., capital $1,000,000, is organized and incorporated at Chicago, Ill., to work the Blue Bell and J. S. claims in Summit camp.——The vein on the Tamarac, Nelson, is opened up at the bottom of the 300-foot winze run from the bottom of the lower tunnel.——The London & B. C. Gold Fields, Ltd., will put in a mill on the Enterprise.——A Robins conveyor will go in at the St. Eugene, East Kootenay.——The Dardanelles M. & M. Co., owning the Dardanelles, Diamond Cross, Dardanelles No. 2, Okanogan, Lady of the Lake, Bosphrus and Gibraltar, in the Dardanelles basin, 4 miles from Sandon, at a recent meeting of the stockholders decided to borrow $45,000 for development purposes. The plant on the property consists of a 50 H. P. boiler, a 20 H. P. sinking pump, a 5-drill Rand compressor, etc.——Shipments of ore from the Boundary Creek mines, near Greenwood, for the last six months of 1900 are as follows:

	Tons.
July	3,150
August	5,850
September	9,000
October	13,800
November	18,300
December (estimated)	19,500
Total	69,600

During 1900 it is estimated that $1,000,000 have been spent by the various mining companies operating at Rossland in improving and adding to their mechanical equipment, the new machinery, etc., at the Le Roi having cost about $500,000 alone.——The new compressor going in on the Nickel Plate will be operated by electric power.——A new compressor, to be operated by electric power, is to go in at the Evening Star. An order for the same is given and it will probably be in place early in the spring.——The 10-drill air compressor recently put in by the New St. Elmo Co. is not being operated at present, owing to mechanical defects.——A new compressor for the Velvet is going in.——The West Kootenay Power & Light Co. will spend $1,000,000 during the coming year in developing 20,000 additional horse power from its water rights on the Kootenay river.

MEXICO.

The Sirena (gold), in the Guanajuato district, worked by the Mexicans from 1550 to 1822, when it became flooded with water and abandoned, is being unwatered by the Guanajuato Co. of New York; pumps operated by electricity are used, and electric power will be used in developing the mine after it is unwatered.——A German company, which recently bought the Valenciana, is unwatering that mine by the same methods employed in the Sirena.

At the Monterey, Sonora, the motive power of the sampling mill at Smelter No. 3, which has been steam, is being changed to electricity. In the place of the two engines which have been running the various ore crushers and rolls, a 70 H. P. electric motor will be substituted.

During 1900 the works of the American Smelting & Refining Co., at Durango, produced the following:

Gold, ounces	43,743
Silver, ounces	1,701,875
Copper, pounds	1,252,363
Lead, tons	7,792

The Escuadra gold mine, near Oactlan, State of Oaxaca, is reported sold to New York men for $3,500,000.

The Cornish rolls at the Lampazos mines, at Lampazos, Sonora, will be replaced by ten stamps; Supt. O. Rountree.——At Placeritas the Moctezuma Copper Co. is completing its new 400-ton-per-day plant; mine is 6 miles from mill, and ore will be hauled by a narrow gauge railway.——A. J. Brandt has completed his new combination mill at Churinibabi, 4 miles north of Placeritas.——The 10-stamp mill of the San Miguelito M. Co. is running on ores from the El Creston de Oro, Goodenough and San Jose mines.

ONTARIO.

The November cleanup of the Mikado, on Shoal Lake, near Rat Portage, was $12,000; it is expected that a saving of $1.50 to $2 per ton has been made by new machinery recently put in; Manager McMillan.

Personal.

V. M. CLEMENT of Salt Lake, Utah, is in Mexico.

D. W. BRUNTON of Denver, Colo., is in Butte, Mont.

J. C. GRIFFITHS of Salt Lake, Utah, is in Denver, Colo.

S. CROASDALE of Denver, Colo., is in Bingham, Utah.

S. NEWHOUSE of Salt Lake, Utah, has gone to Europe.

G. C. MOORE of Salt Lake, Utah, is in Wyandotte, Kan.

C. M. FASSET returned from Corea this week to Spokane, Wash.

C. KIMMERMAN AND A. LENKE, of Chicago, are in Bingham, Utah.

J. S. LAWTON, of the Queen of Sheba, Deep Creek, Utah, is in Chicago.

C. S. FRY of Cripple Creek, Colo., has returned there from Seattle, Wash.

J. H. SHOCKLEY is now manager Turkey Creek mine and mill, Telluride, Colo.

C. O. BAXTER, of the Gilson Asphalt Co., of Salt Lake, Utah, is in California.

J. LEZINSKY of New York and E. S. De Gallier of Boston, Mass., are in Clifton, Ariz.

P. WISEMAN of Butte, Mont., is now manager Shannon Copper Co., Clifton, Ariz.

A. C. MORRISON, Supt. Crystalline, Sonora, Cal., is convalescing in San Francisco.

J. CREIGHTON, Supt. Tesora M. Co., Tintic, Utah, has returned from Hailey, Idaho.

J. H. MCKENZIE, Mariposa C. & M. Co., has returned to San Francisco from Colorado.

PRES. CORAM AND SEC. WILLER of the Bingham C. & G. M. Co., are in Bingham, Utah.

A. H. GUNNELL, assayer for the Baisley-Elkhorn, Baker City, Or., is in Salt Lake, Utah.

C. C. BRAGG of Cincinnati, Ohio, and G. M. Nelson of St. Paul, Minn., are in Gilt Edge, Mont.

SUPT. WRENN of the Century Oil Co.; Bakersfield, Cal., has returned there from San Francisco.

SUPT. W. DOUGLAS, of the Copper Queen, Bisbee, Ariz., has returned there from New York.

A. W. STODDARD of London, Eng., is in Salt Lake, Utah; from there he goes to British Columbia.

W. B. ANDREW, manager Shawmut M. Co., Bingham, Utah, has returned there from the East.

E. A. CARTER, president, and W. B. Thompson, treasurer, of the Shannon Copper Co., are in Clifton, Ariz.

G. K. FISHER, Supt. construction Highland Boy smelter, Bingham, Utah, has returned there from San Pedro, N. M.

A. E. ELLIOTT AND A. P. AYLING of the New England Copper Co., Clifton, Ariz., have returned to New England.

I. S. FOORMAN, president Mokelumne & Campo Seco C. & M. Co., has returned to San Francisco from Calaveras county, Cal.

F. W. GRIFFIN, Pacific coast agent Bucyrus Co., left San Francisco for Milwaukee, Wis., on the 10th, on a wedding trip.

JOSEPH MACDONALD, the new manager of the Alaska Treadwell G. M. Co.'s properties at Douglas island, arrived there Dec. 22.

THOS. CLARK has returned to El Dorado Co., Cal., from the East, and is negotiating for the Gentle Annie and other properties.

GEO. H. PROCTOR of Colo. and Lord Thurlow of England are in San Francisco in connection with acquisition of California mining properties.

T. G. TEMPLE has been appointed foreman Bear Mountain mines, Colville, Wash. Superintendent C. G. Carruthers says the company will run 700 feet of tunnel.

C. W. GOODALE, superintendent of the Boston & Montana smelters at Great Falls, has given to the museum of the Montana School of Mines his large collection of ores and minerals. Prof. Winchell, of the school, says that it is the most valuable that has been received by the institution. The collection includes over 1000 specimens.

J. R. SCUPHAM, manager Boston-South Dakota M. Co., recently seriously injured at Colfax, Cal., is at the Turkey Hill mine, Placer county, Cal., where his company has installed an electric plant.

D. S. JORDAN has been elected president San Francisco Academy of Sciences; corresponding secretary, J. O'B. Gunn; recording secretary, G. P. Rixford; treasurer, L. H. Foote; librarian, L. Falkenau; director of museum, C. A. Keeler. Trustees—W. M. Pierson, J. F. Houghton, W. H. Crocker, C. E. Grunsky, E. J. Molera, G. C. Perkins, G. W. Dickie.

Commercial Paragraphs.

ON the 1st inst. A. Leschen & Sons' Rope Co., main office 920-922 North First street, St. Louis, Mo., opened a New York City office and warehouse at 92 Center street, corner of Leonard. This company owns and manufactures the Leschen patent aerial wire rope tramway, used to transport ore, rock, dirt, timber, etc., which it loads and unloads automatically.

THE free scholarship offer made in another column by the American School of Correspondence, Boston, Mass., is worthy of notice. Without leaving home or losing time from work, the student pursues a course of study, instruction papers, prepared especially for teaching by mail, being furnished free. In addition, special information regarding any difficulties in their studies is furnished students without any extra charge. It should be the ambition of every man to advance in his trade or profession. A mechanic with practical experience, supplemented by theoretical education, can command a better position than a man without such an education.

Books Received.

"Field Manual for Engineers," 16 mo., 401 pages, 152 figures, morocco; author, P. H. Philbrick. He says it is his intent to present the subjects of the text in a mathematical and logical order; to classify all problems presented so as to be easily referred to, and to express the resulting formula of every problem in the form requiring the least numerical computation, in all of which he has achieved an unusual measure of success. Published by Jno. Wiley & Sons, New York City; price, $3.

Catalogues Received.

"Wire Rope and Its Application to the Transmission of Power," etc., is the latest booklet issued by the Trenton Iron Co., Trenton, N. J. There are several good things in it. The chapter on "The Effect of Bending Upon Wire Rope" could be read with profit by every user thereof. The booklet will be sent upon application.

Recently Declared Mining Dividends.

	Payable.
Daly-West M. Co., Utah, 30 cents per share, $45,000	Jan. 5
Empire State-Idaho M Co., Idaho, 30 cents per share, $29,554.20	Jan. 15

Notices of Recent Patents.

Among the patents recently obtained through Dewey, Strong & Co.'s SCIENTIFIC PRESS U. S. and Foreign Patent Agency, the following are worthy of special mention:

APPARATUS FOR AGING WINES OR LIQUORS.—No. 664,538. Dec. 25, 1900. A. B. C. Dowdell, St. Helena, Cal. This invention consists of a vertical wooden tank having vertical tubes extending from top to bottom, and means including flanged plates fitted to the ends of the tube for forming close joints with the tank bottom. There is an exterior chamber within which the tank is contained, and means for heating and means for circulating the air through the tank, and within the chamber; also means for protecting the tubes against leakage when the wine is withdrawn from the tank, consisting of disks fitting over the bottoms of the tubes and screw rods extending upwardly, transverse bars at the tops, and nuts screwing upon the upper ends of the rods by which the closure plates at the bottom are drawn tight whereby tubes may be filled with liquid to prevent contraction.

FOLDING BEDS.—No. 664,539. Dec. 25, 1900. Daniel Eisner, San Francisco Cal., one-half assigned to J. J. Justice, New York, N. Y. This invention relates to improvements in that class of furniture known as "folding beds," in which the device is extended for use as a bed and when closed up is made to resemble some other article of furniture and conceal its true identity. It consists in the combination in a folding bed of the head and foot portions with a lazy-tongs connection whereby they are extensible or closable toward each other, jointed pivoted side rails and a mattress carried thereon. A board is hinged to the head portion and is foldable so as to form a top when the device is closed together. There is a latch by which the foot portion of the structure is locked so as to resemble a bureau front, and boxes are hinged to the sides of the head section turnable in horizontal planes about the hinges, said boxes having angular notches adapted to engage corresponding notches in the board when the latter is turned upwardly about its hinges and prevent its falling when the bed is extended.

FASTENING FOR STRUCTURAL IRON.—No. 665,194. Jan. 1, 1901. G. H. Dyer, San Francisco, Cal. This invention is designed to provide a means for securely and economically locking the parts of iron structures together, such as prison cells, animal cages, ships' gratings, window guards, sidewalk grates, floor, ceiling, wall and building construction generally, and also for fences, elevator inclosures, bookcases, shelving and a great variety of structures in which steel and iron largely enter. It consists of peculiarly slotted plates adapted to receive transverse bars extending through said plates and locking bars passing through the plates in such relation to the first named bars as to firmly lock and secure them and the plates together.

List of U. S. Patents for Pacific Coast Inventors.

REPORTED BY DEWEY, STRONG & CO., PIONEER PATENT SOLICITORS FOR PACIFIC COAST.

FOR THE WEEK ENDING JAN. 1, 1901.

665,158.—BORING MACHINE — W. R. Abrams, Portland, Or.
664,921.—DRAFT EQUALIZER—J. W. Arehart, Harrisburg, Or.
665,361.—WEIGHING MACHINE — J. W. Berry, Tacoma, Wash.
665,169.—CAR VENTILATOR—L. H. Bowman, Walla Walla, Wash.
665,057.—WRITER'S COMPANION—J. D. Brower, Salem, Or.
665,172.—CURRY COMB—J. Carden, Gardena, Cal.
665,192.—HYDRAULIC VALVE—D. C. Demarest, Angels, Cal.
665,194.—IRON FASTENINGS—G. H. Dyer, S. F.
665,365.—FRUIT CLEANER—G. H. Ferguson, Redlands, Cal.
665,204,—STRAP LOCK—H. P. Gehricke, Los Angeles, Cal.
665,088.—CAN BODY MACHINE—J. Gould, Jr., Berkeley, Cal.
665,215.—WINDOW WASHER—B. S. Harris, Oakland, Cal.
665,346.—FILTER—R. C. Reed, S. F.
664,896.—COILING PLASTIC MATERIAL—R. Robertson, Santa Cruz, Cal.
664,902.—EARTH AUGER—Scott & Gerry, New Whatcom, Wash.
665,277.—BUTTER SCOOP—R. A. Simpson, Ferndale, Cal.
665,374.—TIMS LOCK—H. C. Stockwell, Los Angeles, Cal.

Latest Market Reports.

SAN FRANCISCO, Jan. 10, 1901.

SILVER—Per oz., Troy: London, 29⅝d (standard ounce, 925 fine); New York, bar silver, 63⅞c (1000 fine); San Francisco, 63⅞c; Mexican dollars, 50½c.

COPPER.—New York: Lake, 1 to 3 casks, $17.25 cash; carload lots, 17.00; Electrolytic, 1 to 3 casks, 16.87½; carload lots, 16.62½; Casting, 1 to 3 casks, 16.75; carload lots, 16.50. San Francisco: 18. Mill copper plates, 20c; bars, 22@23c.

LEAD.—New York, $4.37½; Salt Lake City, $4.00; St. Louis, $4.20; Missouri lead, $4.32½ desilverized lead; San Francisco $5.00, carload lots; 5½c 1000 to 4000 lbs.; pipe 6¾, sheet 7½, bar 6c; pig, $4.70 @5.10. London, £16 6s 3d per ton.

The conditions as to trust prices remain unchanged—$4 in Utah.

SPELTER. — New York, $4.15; St. Louis, $3.95; San Francisco, ton lots, 5¼c; 100-lb lots, 6c.

ANTIMONY.—New York, Cookson's, 10c; Hallett's, 9½c; San Francisco, 1000-lb lots, 12c; 300 to 500 lbs., 13@14c; 100-lb lots, 15@18c.

IRON.—Pittsburg, Bessemer pig, $13.50; gray forge, $13.75; San Francisco, bar, per lb., 2.65c in small quantities.

STEEL.—Bessemer billets, Pittsburg, $19.75; open hearth billets, $21.00; San Francisco, bar, 7c to 12c per lb.

TIN.—New York, pig, $27.00; San Francisco, ton lots, 29c; 1000 lbs., 29¼c; 500

lbs., 29½c; less, 30c; bar tin, ₱ lb, 35c.

QUICKSILVER.— New York, $51.00; large lots: London, £9 2s 6d; San Francisco, local, $48.00 ₱ flask of 76½ lbs.; Export, $45.

Receipts of quicksilver at San Francisco for last month were 2393 flasks; for the entire year, 21,039 flasks.

Exports of quicksilver from San Francisco in December by sea were:

	Flasks.	Value.
Mexico	552	$24,859
Central America	102	4,594
New Zealand	5	240
British Columbia	2	94
New York	50	2,500
Totals	711	$32,287

Exports of quicksilver from San Francisco by water for 1900 were:

	Flasks.	Value.
China	1,000	$ 50,000
Mexico	4,683	216,506
Central America	1,416	65,416
Australia	100	4,650
New Zealand	5	240
British Columbia	13	636
Siberia	7	343
Washington	5	257
New York	70	3,500
Totals	7,299	$341,548

NICKEL.—New York, 50@60c ₱ lb.

MAGNESIUM.—New York, $3.00 ₱ lb.; San Francisco, $4.00.

ZINC.—San Francisco, 5½c; slab, 5¾c; bar, 7c.

BABBITT METAL.— San Francisco, No. 1, 10c.

SOLDER. — Half-and-half, 100-lb. lots, 18½c; San Francisco, Plumbers', 100-lb. lots, 15½c.

ASSAY LITHARGE.—San Francisco, 10c ₱ lb, small lots.

BISMUTH.—New York, ₱ lb., $1.60 50-lb lots; San Francisco, $2.50 to $2.75 lb lots.

PLATINUM.— San Francisco, crude, $17 ₱ oz.; New York, $18.20 per Troy oz

ALUMINUM.—New York, No. 1, 99% pure ingots, 35c; No. 2, 90%, 30c to 35c.

FERRO-MANGANESE. — Pittsburg, 80%, domestic, $85, large lots.

PHOSPHORUS. — F. o. b. New York 50@60c ₱ lb.

TUNGSTEN.—New York, ₱ lb., 95c; San Francisco, $1.15.

FERRO-TUNGSTEN. — New York, 37%, 35c; San Francisco, 65c (60%).

POWDER.—F. o. b. San Francisco: No 1. 70% nitro-glycerine, per lb., in carload lots, 15½c; less than one ton, 17½c. No. 1*, 60%, carload lots, 13½c; less than one ton, 15½c. No. 1** 50%, carload lots, 11¾c; less than one ton, 13¾c. No. 2, 40%, carload lots, 10c; less than one ton, 12c. No. 2* 35%, carload lots, 9½c; less than one ton, 11½c. No. 2** 30% carload lots, 9c; less than one ton, 11c. Black blasting powder in carload lots, minimum car 728 kegs, $1.50 per keg; less car lots, $2 per keg.

CAPS.—3x, $5.50 per 1000; 4x, $6.50; 5x, $8; Lion, $9, in lots not less than 1000.

FUSE.—Triple tape, $3.60 per 1000 feet; double tape, $3.00; single tape, $2.65; Hemp, $2.10; Cement No. 2, $3.00; Cement No. 1, $2.65, in lots of 3000 feet and up.

CANDLES.—Granite 6s, 16 oz., 40s., 11½c ₱ set; 14 oz., 40s., 10c.

CHEMICALS.—Cyanide of potassium, 98%-99%, jobbing, 32½@33½c ₱ lb.; carloads, 30@31c; in 10-lb. tins, 40c; sulphuric acid, in carboys, 66% B, 2c ₱ lb.; soda ash, $1.60 ₱ 100 lbs. 58%; hyposulphite of soda, 2¾@3c ₱ lb.; blue vitriol, 5½@6c ₱ lb.; borax, concentrated, 7@8c ₱ lb.; chlorate of potash, 12@13c; roll sulphur, 6c; alum, $1.90@2.00; flour sulphur, French, 2½@2¾c; California refined, 1¾@2c; nitric acid, in carboys, 8c ₱ lb.; caustic soda, in drums, 3@4c ₱ lb.; Cal. s. soda, bbls., $1.00; sks, 95c ₱ 100 lbs.; chloride of lime, spot, $2.50@2.60; nitrate of potash, in kegs, 8c; caustic potash, 10c in 40-lb. tins.

COAL. — San Francisco, coast, yard prices: Wellington, $9; Seattle, $7.00; Coos Bay, $5.50; Southfield, $9.00. Cargo lots, Eastern and foreign: Wallsend, $8.00; Brymbo, $7.50; Pennsylvania, hd., $14.00; Scotch, $8; Cumberland, $12; Cannel, $9.50; Welsh Anthracite, $12.00; Rock Springs, $8.50; Colorado Anthracite, $14.50. Coke, $16 per ton in bulk; $18 in sacks.

Special Meeting of Stockholders.

Notice is hereby given that a special meeting of the stockholders of the RUBY GOLD GRAVEL MINING COMPANY will be held at the principal office of the Company, Room 24, 320 Sansome St., in the city of San Francisco, Cal., on TUESDAY, the 29th day of January, 1901, at 2 o'clock P. M., for the purpose of electing a Board of Directors and the transaction of such other business as may come before the meeting. JOSEPH H. MOOSER, Secretary Ruby Gold Gravel Mining Company, 320 Sansome St., Room 24, San Francisco, Cal.

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THE CALIFORNIA DEBRIS COMMISSION, HAVing received applications to mine by the hydraulic process from John Costa et als., in the Lady's Canyon Mine, near Sierra City, Sierra Co., to deposit tailings in worked-out pits; from W. B. Dudley et als., in the Dudley Placer Mine, near North Columbia, Nevada Co., to deposit tailings in a worked-out pit; from the Eagle Gold Mining Co., in the Reichel Claim, near Mountain Ranch, Calaveras Co., to deposit tailings in Murray Creek; and from the Emery Gold Mining and Water Co., in the Rose Hill Mine, near Mountain Ranch, Calaveras Co., to deposit tailings in Murray Creek, gives notice that a meeting will be held at Room 59, Flood Building, San Francisco, Cal., on January 14, 1901, at 1:30 P. M.

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DEWEY, STRONG & CO.,
PATENT AGENTS, 330 Market St., S. F.

Annual Meeting.
The Regular Annual Meeting of the Stockholders of THE REAL ESTATE COMBINE will be held at the principal office of said Corporation, said principal office being situated at No. 14 Sansome St., Room No. 15, San Francisco, California, on THURSDAY, the 17th day of January, A. D. 1901, at the hour of 3 o'clock P. M. of said day; said meeting being held for the purpose of electing a Board of Directors to serve for the ensuing year and for the transaction of such other business as may come before the Meeting.
GEORGE STERLING, Secretary of The Real Estate Combine.
Principal Office—No. 14 Sansome St., Room No. 15, San Francisco, California.

Annual Meeting.
The Regular Annual Meeting of the Stockholders of THE REALTY SYNDICATE will be held at the principal office of said Corporation, said principal office being situated at No. 14 Sansome St., Room No. 15, San Francisco, California, on THURSDAY, the 17th day of January, A. D. 1901, at the hour of 11 o'clock A. M. of said day; said meeting being held for the purpose of electing a Board of Directors to serve for the ensuing year and for the transaction of such other business as may come before the Meeting.
J. C. WINANS, Secretary of The Realty Syndicate.
Principal Office—No. 14 Sansome St., Room No. 15, San Francisco, California.

Annual Meeting.
The Regular Annual Meeting of the Stockholders of the PIEDMONT DEVELOPMENT COMPANY will be held at the principal office of said Corporation, said principal office being situated at No. 14 Sansome street, Room No. 15, San Francisco, California, on WEDNESDAY, the 16th day of January, A. D. 1901, at the hour of 3 o'clock P. M. of said day; said meeting being held for the purpose of electing a Board of Directors to serve for the ensuing year and for the transaction of such other business as may come before the meeting.
GEORGE STERLING, Secretary of the Piedmont Development Company.
Principal office—No. 14 Sansome street, Room No. 15, San Francisco, California.

Annual Meeting.
The Regular Annual Meeting of the Stockholders of the MUTUAL INVESTMENT UNION will be held at the principal office of said Corporation, said principal office being situated at No. 14 Sansome street, Room No. 15, San Francisco, California, on MONDAY, the 21st day of January, A. D. 1901, at the hour of 3 o'clock P. M. of said day. said meeting being held for the purpose of electing a Board of Directors to serve for the ensuing year and for the transaction of such other business as may come before the meeting.
J. C. WINANS, Secretary of the Mutual Investment Union.
Principal office—No. 14 Sansome street, Room No. 15, San Francisco, California.

NOTICE OF AMENDMENT OF ARTICLES OF INCORPORATION.
Notice is hereby given that it is the intention of the JAMISON MINING COMPANY to amend its Articles of Incorporation by substituting for the second of said articles setting forth the purposes of the Corporation, which now reads:
"2nd. That the purposes for which it is formed are: The acquisition of quartz mines and gravel mines in the State of California, and to work the same for gold and silver; also, to acquire, hold and use water and water-rights and privileges in connection with such mining; also, to acquire, hold and use timber lands in connection with such mining," the following:
Second:—That the purposes for which it is formed are: To mine for, and mill and reduce ores of all kinds; to acquire by location, purchase or otherwise, to own, hold, work and operate mines in and throughout the State of California; to acquire by purchase or otherwise, to own, hold, develop, improve, lease, let, mortgage, grant, bargain, sell and convey mines, and mining claims and properties in the State of California; to acquire, by purchase or otherwise, to build, erect, construct, own, operate, lease, let, mortgage, grant, bargain, sell and convey mills, and other reduction and smelting works, for the milling and reduction and smelting of ores, and to deal in precious metals and minerals and the products of mines of every kind, and to transport and provide ways and means to transport the same to market, and to market and sell the same; to acquire, by purchase or otherwise, to improve, develop, own, hold, use, lease, let, mortgage, grant, bargain, sell and convey real property, lands, water, water-rights, privileges, and franchises of every kind, in and throughout the State of California; to buy, own, hold, sell and generally deal in goods, wares and merchandise, and all kinds of personal property, including the stocks of other corporations, also bonds, notes and personal securities of every kind. To establish and maintain agencies of said Corporation, and to appoint and employ agents, wherever it may be deemed best by said Company; and generally to do any and everything necessary, proper or expedient to carry out the aforesaid purposes and carry on the business of said Corporation.

NOTICE OF STOCKHOLDERS' MEETING.
A Special Meeting of the Stockholders of the JAMISON MINING COMPANY for the purpose of considering and acting upon the matter of Amending its Articles of Incorporation, as above provided, will be held at the office of the company, room 54, 120 Sutter street, San Francisco, California, at two o'clock P. M. on Monday, the 11th day of February, 1901.
By order of the Board at its meeting of December 31st, 1900. SAM W. CHEYNEY,
Secretary Jamison Mining Company.

HEALD'S
BUSINESS COLLEGE
And School of Practical Sciences.
24 Post Street, - - - San Francisco.
MINING AND CIVIL ENGINEERING DEPARTMENT: Mathematics, Draughting, Strength of Material, Chemistry, Assaying, Blow-Pipe Analysis, Geology, Mineralogy, Surveying, etc.
ELECTRICAL DEPARTMENT: Theory and Practice; Construction. Mechanical Drawing.
BUSINESS: Bookkeeping, Shorthand, Typing, Modern Languages, etc.
Twenty-five teachers; individual instruction; can enter at any time; Catalogue and Journal free.

Electric, Railway and Manufacturers' Supply Co.,
RAILWAY SUPPLIES AND ELECTRICAL SPECIALTIES.
Pacific Coast Agents ERICSSON TELEPHONE COMPANY.
WE CARRY FULL LINE OF ABOVE GOODS.
548 MISSION STREET, SAN FRANCISCO, CAL.

POINTS OF EXCELLENCE
OF OUR NEW
JACK-HEAD PLUNGER PUMP.
Pumps sand and grit without injury to cylinder.
Seldom requires packing and is easily repacked.
Forces water on the down stroke so does not require balanced bob.
Water column and pump rod can be made to perfectly balance.
Each pump is provided with an automatic air valve which relieves pump of air taken in when suction gets out of water.
Combines strength with lightness.

We make a specialty of pumps and would be pleased to forward to you our catalogue.
Send us your inquiries.

W. T. GARRATT & CO.,
Cor. Fremont and Natoma Sts.,
SAN FRANCISCO, CAL.

T.P. G.W.P. J.P. E.P.
PENNINGTON
TRADE MARK
SAN FRANCISCO, CAL.

OUR SPECIALTIES ARE:
Hammered Steel Shoes and Dies, Cam, Crank and Steamboat Shafts, Rock-Breaker Plates, Connecting Rods, Well-Boring Tools, General Blacksmithing.
Correspondence Solicited, and Circulars Mailed Upon Request.
GEO. W. PENNINGTON SONS, INC.
218 and 220 Folsom St.,.....San Francisco, Cal.

A BORE HOLE
is the cheapest, quickest, most direct, and most effective way to test lands for minerals, oil, gas, salt, sulphur, borax, water, etc.

THE STAR DRILLING MACHINES
excel for these uses. They will drill a hole through anything to any depth from 250 to 2500 feet. The only machines made that are absolutely without annoying springs. They are simple, powerful and efficient. Easy to handle at work or on the road. Used in every State and Territory and in many foreign countries.
We also make full line of drill tool-bits, reamers, sand pumps, spuds, etc., etc. Write for illustrated free catalogue.
Star Drilling Machine Co.,
Akron, Ohio.

DENVER & RIO GRANDE R.R.
SCENIC LINE OF THE WORLD

The ∴ Mining Man's Favorite Route
BETWEEN
Denver, Colorado Springs, Pueblo and Florence, Cripple Creek, Leadville, Glenwood Springs, Aspen, Gunnison, Lake City, Creede, Durango, Silverton, Telluride and Ouray,
Reaching all the Mining, Milling, Cyaniding, Chlorinating and Smelting centers in Colorado and Utah, and all mining points in California, British Columbia and the Pacific Northwest by close connections and a perfect system of through car service.
Pullman Palace and Tourist Sleeping Cars between Denver and San Francisco and Los Angeles, and Pullman Palace and Tourist Sleeping Cars and Free Reclining Chair Cars between Denver and Portland. : : A Perfect Dining Car Service on All Through Trains. : :
For Illustrated Pamphlet, address
W. J. SHOTWELL, G. A. D. & R. G. R. R., 126 California St., San Francisco, Cal.
S. K. HOOPER, G. P. & T. A., Denver, Colo.

UNION IRON WORKS,

222 Market Street, San Francisco, Cal.

Manufacturers of All Classes of MINING MACHINERY.

COPPER AND LEAD-SILVER SMELTING PLANTS,

Latest Improved Water Jacket Furnaces,

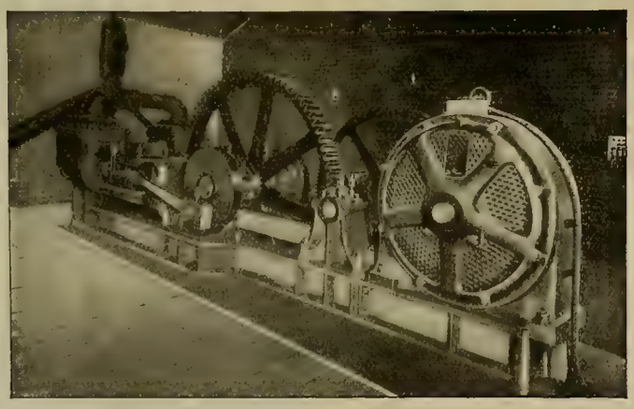
CONVERTERS AND ROASTING FURNACES,

Hoisting and Pumping Machinery,

AIR COMPRESSORS,

Stamp Mills and Concentrating Plants,

HIGH GRADE ENGINES AND BOILERS.



Westinghouse Induction Motor Operating Pump.

WESTINGHOUSE ELECTRIC — THE NAME WESTINGHOUSE IS A GUARANTEE

Westinghouse Motors

Operate Economically Everywhere.

Westinghouse Electric & Manufacturing Co.

All Principal Cities in U. S. and Canada.

Pittsburg, Pa.

THE MINE AND SMELTER SUPPLY CO.,

DENVER, - - COLORADO.

Mining and Milling Machinery and Supplies.

We beg to call your attention to

THE FINLAYSON PATENT WIRE ROPE TRAMWAY—

the latest and best system of double-rope automatic aerial tramway in the market.
If interested in the most economical system of transporting ores from mine to mill and to shipping stations, send for our special tramway catalogue.

We carry a complete stock of Machinery and Supplies for immediate delivery.

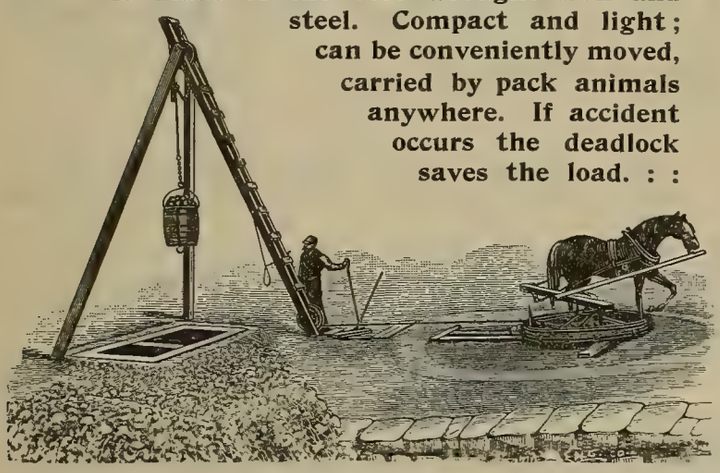
Send for our special catalogues on Mining Machinery, Milling Machinery, Wilfley Concentrators, Tramways, Power Transmission Machinery, Machine Tools, Etc.

THE MINE AND SMELTER SUPPLY CO.,.....Denver, Colorado.
THE MINE AND SMELTER SUPPLY CO.,.....Salt Lake City, Utah.
THE MEXICO MINE AND SMELTER SUPPLY CO.,
No. 16 San Francisco St., City of Mexico.

BOILERS, ENGINES, STEAM HOISTERS, ELECTRIC HOISTERS, ROLLS, CRUSHERS, WILFLEY TABLES, CARS, CAGES, ORE BUCKETS, RAIL, PIPE, FITTINGS, BELTING, ETC., ETC.

THE COMMON SENSE WHIM

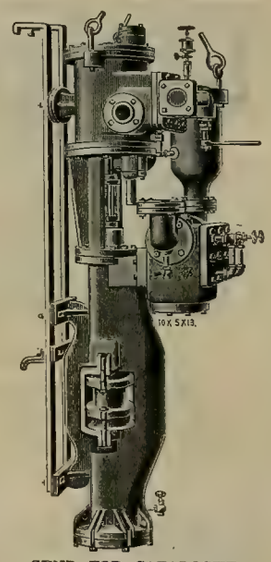
Is made of the best wrought iron and steel. Compact and light; can be conveniently moved, carried by pack animals anywhere. If accident occurs the deadlock saves the load. : :



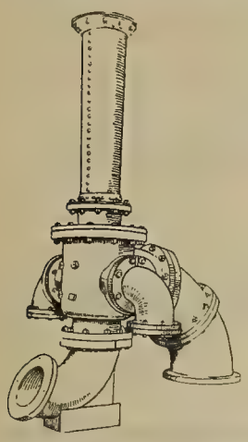
SINKING PUMPS,

Indispensable in sinking mining shafts or pumping out flooded mines. Easily raised or lowered by cable or rope. Equipped with outside packed plungers. Handles gritty or dirty water. Operates bolted to shaft timbers or only suspended by cable at any angle. Packing glands external. May be adjusted while in motion. Removable parts hinged. Steam movement positive and simple.

THE RISDON IRON WORKS,
MANUFACTURERS,
SAN FRANCISCO, CAL.



SEND FOR CATALOGUE.



THE EVANS HYDRAULIC ELEVATOR,

MANUFACTURED BY

RISDON IRON WORKS, San Francisco.

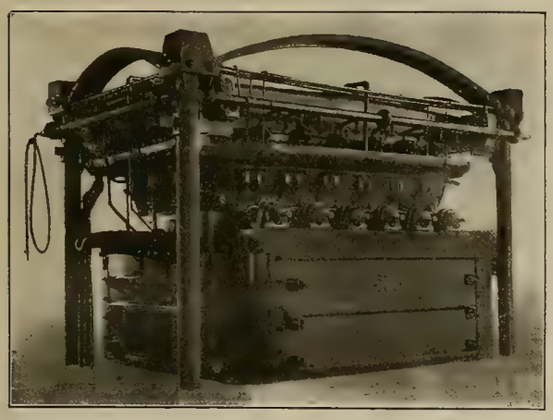
Used in Unwatering the Comstock Lode.

SEND FOR CATALOGUE NO. 5.

The cheapest and most efficient Water Elevator made.
It will do more and better work than any other Gravel Elevator.
It is fully protected by United States and Canadian letters patent.

THE COLORADO IRON WORKS COMPANY,

ENGINEERS AND MANUFACTURERS OF



Smelting Furnaces and Equipments.

The illustration in this advertisement shows one form of our COPPER MATTING FURNACE, employing hot blast; the air being first treated in proper appliance, is conducted through the cast iron bustle pipes placed along the inside of the caisson plates, through the cast iron adjustable tuyeres. This furnace can also be used for silver as well as copper smelting, by changing lining in crucibles. We build them in any size required.

Cold blast may be used if preferred.

The furnace is equipped with our special cast iron jackets, and our patented system of water-jacketed mantles.

Send for our catalogue, showing many different styles of smelters for the treatment of

GOLD, SILVER, LEAD, COPPER AND NICKEL ORES,

also the latest and best method for the economical use of jacket water (a saving of 80% to 90% guaranteed) by our patented

WATER VAPORIZING ATTACHMENT.

We design, manufacture and erect Mills for Concentration and Amalgamation, Milling, Chlorination and Cyanide Processes. In writing for information, give us the analysis or character of the ore to be treated, to enable us to intelligently arrive at the proper method.

Our very complete catalogue of CRUSHING MACHINERY will be sent on application.

THE COLORADO IRON WORKS COMPANY,

ESTABLISHED 1860. DENVER, COLORADO, U. S. A.

CHAS. C. MOORE & CO.,

ENGINEERS,

AND DEALERS IN : : : :

High Grade Machinery.

COMPLETE PLANTS INSTALLED.

32 First Street,

Branches—Los Angeles, Seattle. San Francisco, Cal.

Pacific Coast Office

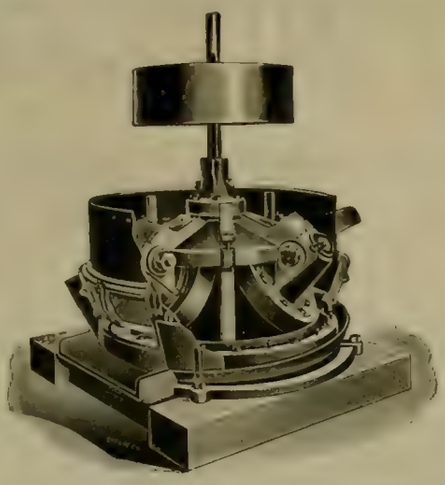
The Babcock & Wilcox Company,

PATENT WATER TUBE

STATIONARY BOILERS MARINE

CHAS. C. MOORE,
MANAGER,
32 FIRST STREET, SAN FRANCISCO, CAL.

DEWEY, STRONG & CO., Patent Agents, 330 Market St., S. F., Cal.

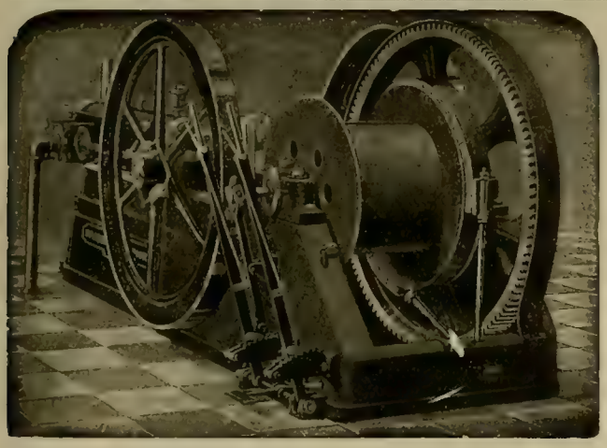


THE GRIFFIN
THREE ROLLER
ORE MILL.

The Griffin Three Roller Ore Mill is a simply constructed Mill, suitable for working all kinds of ores that require uniformly fine crushing by the wet process. This Mill is a modification of the well-known Chilian Mill, but the rollers run upon a crushing ring or die, which is inclined inwardly at an angle of about 30 degrees, the rollers themselves also being inclined to the central shaft of the Mill, thus utilizing the centrifugal force, as well as the weight of the rollers themselves as a crushing agent. The Griffin Three Roller Ore Mill is therefore a Mill of great strength, and has few wearing parts. We construct these Mills with extreme care, using only the best of raw materials, which are most carefully worked by men who are specialists as mill builders. We sell the Griffin Ore Mill on its determined merits, and will gladly supply full information regarding it to any one.

SEND FOR FREE ILLUSTRATED AND DESCRIPTIVE CATALOGUE TO

Bradley Pulverizer Co., Boston, Mass.



FAIRBANKS-MORSE GASOLINE-DISTILLATE GEARED HOISTER.

An efficient and reliable combination of a Fairbanks-Morse Gasoline-Distillate Engine on the same base with a Friction Hoist. Modern and up to date. We publish a special catalogue describing our Hoister which we gladly mail prospective purchasers.

FAIRBANKS-MORSE GASOLINE-DISTILLATE ENGINES.

ALL SIZES UP TO AND INCLUDING 54 HORSE POWER.
For Pumping, Milling, Lighting, Air Compressors, Etc.

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Leschen Co.'s {Patent Aerial} {WIRE ROPE} TRAMWAY

FOR TRANSPORTATION OF ORE, COAL, DIRT, TIMBER, ETC.

Perfect Grip Clip,
Absolutely Safe,
Loads Automatically,
Unloads Automatically,
Operated by One Man,
Cost of Maintenance Low,
Capacity Largest Obtainable.

ALSO SOLE MANUFACTURERS
PATENT FLATTENED STRAND

HERCULES WIRE ROPE

[TRADE MARK REGISTERED.]

—AND—

Wire Rope

OF EVERY DESCRIPTION.

MANILLA, SISAL, BLOCKS, ETC.

A. LESCHEN & SONS ROPE CO.,

Home Office: 920-922 North Main St., ST. LOUIS, MO. Branch Offices: 92 CENTER ST. (Cor. Leonard St.), NEW YORK. 47-49 SOUTH CANAL ST., CHICAGO, ILLS.

DOW PUMPS

ARE MANUFACTURED IN

Great Variety **FOR MINING PURPOSES** Operated by

Steam, Air, Electric or Water Power.

Vertical SINKING PUMPS, Bucket or Double Plunger Pattern.
Deep Mine STATION PUMPS.

MAKE KNOWN YOUR WANTS TO THE : : :

GEO. E. DOW PUMPING ENGINE CO.,

Successors to the DOW STEAM PUMP WORKS. SEND FOR CATALOGUE. SAN FRANCISCO, CAL.

CROWN GOLD MILLING CO.

To MINERS and MILLMEN.

If your ores are refractory; if you are losing concentratable values in your tailings; if your mines are in an arid district, or so situated as to make the introduction of water ruinously expensive; if you have large bodies of concentratable ores which could not be profitably treated hitherto,

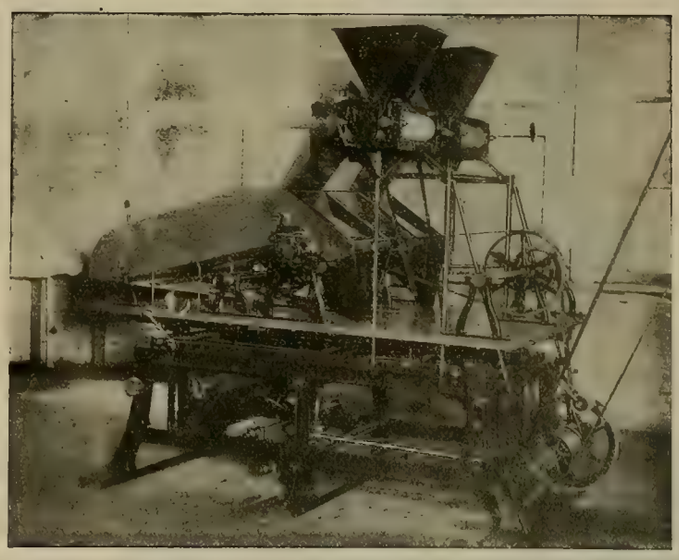
THEN READ WHAT FOLLOWS:

The CROWN GOLD MILLING COMPANY'S concentrating machinery will concentrate any ores, sands or earths carrying metallic particles or metallic combinations of concentratable dimensions.

A shipping product of unexcelled purity is given, the greatest amount of concentratable values extracted, and a greater tonnage of ore is put into a ton of concentrates than by any other system of mechanical treatment. Every pound of ore delivered to machines is accounted for in the ore and concentrate bins.

It will cost you nothing to investigate, and may mean an increased profit on your ores, or a profit on bodies of ores which heretofore have failed to pay more than cost of treatment; or you may be enabled to make a productive property of a mine now idle.

We have a twenty-ton capacity plant in operation. All are invited to call and test it: from 1000 to 2000 pounds ore will be treated as a test. Charge $20, to cover cost assays. Results at mine guaranteed to equal results obtained in testing. Wear and tear and labor cost guaranteed not to exceed cost by wet treatment of same character of ores.

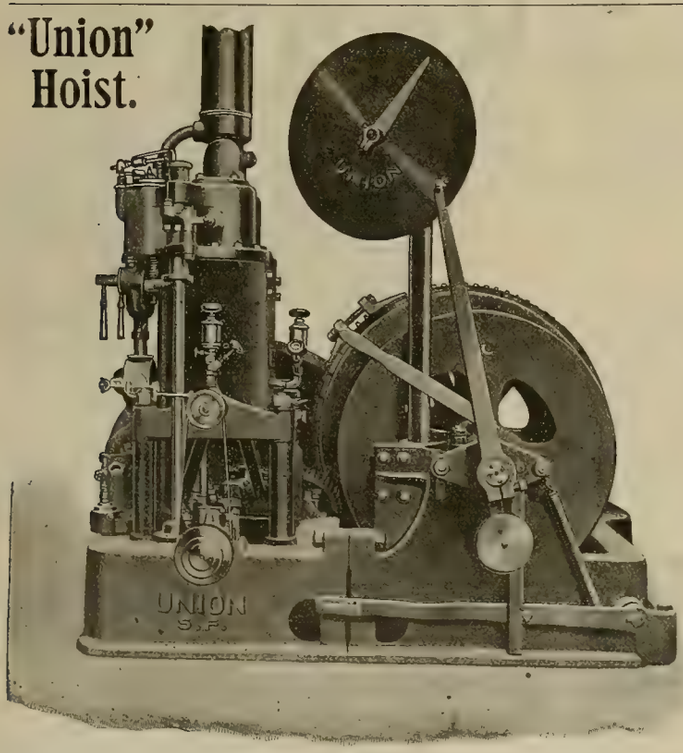


Our machines are not for sale: they are placed on lease or royalty charge as may be agreed upon, and if results are not obtained as guaranteed no one loses but ourselves. Practice is better than theory: direct evidence is better than hearsay. All we ask of you is to come and be convinced that we have claimed less than we accomplish.

Office,.....230 Post St.
Works,.....23 Stevenson St.

SAN FRANCISCO, CAL.

"Union" Hoist.



The above illustrates the 25 H. P. double cylinder, single drum "Union" hoist, with all the latest improvements.

THE UNION GAS ENGINE CO.

—BUILD THE—

"Union" Gas Engines,

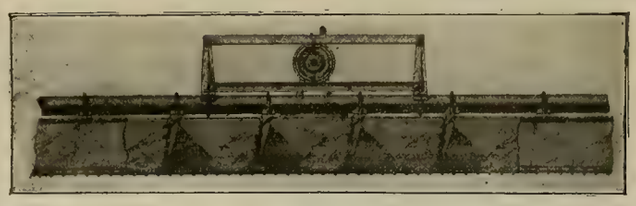
Which use either MANUFACTURED or NATURAL GAS, ORDINARY STOVE GASOLINE (NAPHTHA or BENZINE), DISTILLATE or KEROSENE.

STATIONARY ENGINES for All Kinds of Work in Sizes from 3 to 300 h. p. in actual use.
"UNION" COMBINED HOISTS in Sizes from 2 to 130 h. p. in actual use.
"UNION" COMBINED COMPRESSORS—20, 30, 40 h. p.
HOISTS and COMPRESSORS Can Be Built in Larger Sizes to Order
"UNION" MARINE ENGINES, 4 to 200 h. p., of Single, Double and Four-Cylinder Types.
FIFTEEN YEARS' EXPERIENCE Building Gas and Oil Engines.
"UNION" ENGINES Are In Use All Over the United States.
"UNION" ENGINES Are Simple, Durable and Economical.

Office, 248 First Street. Works, Corner First and Clementina Streets. SAN FRANCISCO, CAL.

RECIPROCATING CONVEYORS

FOR TRANSPORTING QUARTZ, TAILINGS, SAND, ETC.



FEEDING AND MEASURING DEVICES.
PERFECT DISCHARGE ELEVATORS.
COMPLETE INSTALLATIONS.

HEYL & PATTERSON, Pittsburg.

ADAMANTINE SHOES AND DIES.

CHROME CAST STEEL.

CANDA Improved Self-Locking CAMS.

TAPPETS, BOSSES, ROLL SHELLS AND CRUSHER PLATES.

These castings are extensively used in all the mining States and Territories of North and South America. Guaranteed to prove better and cheaper than any others. Orders solicited subject to the above conditions. When ordering, send sketch with exact dimensions. Send for Illustrated Circular.

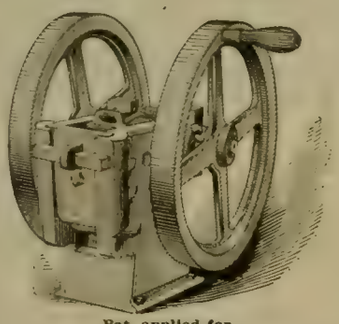
Manufactured by CHROME STEEL WORKS, Brooklyn, N. Y.

H. D. & H. W. MORRIS,
AGENTS,
Room 194 Crocker Building, San Francisco, Cal.

Canda Cam.

DEWEY, STRONG & CO., Patent Solicitors, 330 Market St., San Francisco, Cal.

Time, Labor and Money Saved for Assayers.

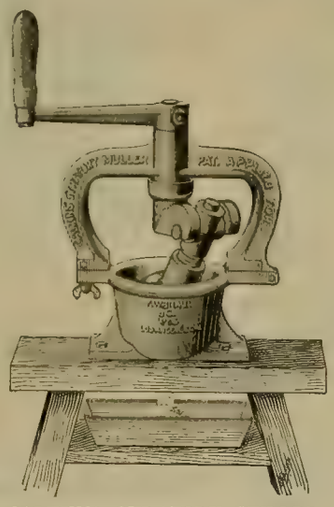


Pat. applied for.

THE SIMPLEX ORE CRUSHER.

For crushing and pulverizing small quantities of ore by either hand or power. It is more easily operated than any other machine of its capacity on the market.

Its features are ease of opening for cleaning and simplicity of adjustment.



CALKINS' GYRATORY MULLER.

A recent invention for reducing crushed ore samples to a pulp. Will quickly pulverize to 100 mesh or finer.

Supersedes the slow and laborious Bucking Plate.

CALKINS' RADIAL BUCKING PLATE.

Designed to replace the old method of pulverizing crushed ore samples to a pulp of any desired fineness with but a fraction of the energy required to operate the old style Bucking Board and Muller.

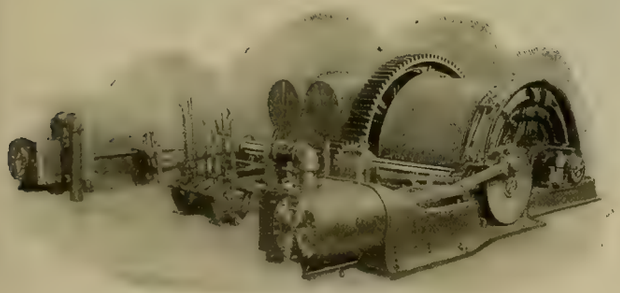
WRITE FOR OUR NEW DESCRIPTIVE PAMPHLET IN WHICH ALL OUR NEW SPECIALTIES ARE FULLY DESCRIBED.

F. W. BRAUN & CO.,

Manufacturers of Modern Appliances for Assayers,

LOS ANGELES, CAL.

EXTRA HEAVY DOUBLE DRUM SECOND MOTION HOIST.



DO YOU REQUIRE A

HEAVY DUTY GEARED HOISTING ENGINE?

IF SO, WRITE TO US.

We have a large line of patterns for these plants and will build you one to meet your exact requirements and for ROUND OR FLAT ROPE.

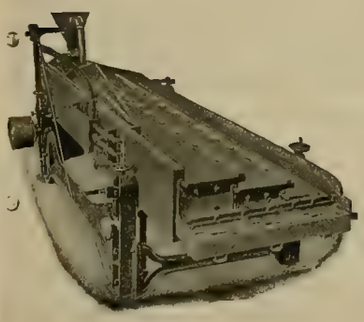
Our stock of Boilers, Pumps, Compressors, Drills and General Mine Supplies is unequaled in the United States.

YOUR CORRESPONDENCE IS SOLICITED.

The Hendrie & Bolthoff M'f'g & Supply Co.

No. 34. DENVER, - - - - - - - COLORADO.

THE IMPROVED BARTLETT CONCENTRATING TABLE.



The only table made that will take the place of jigs and do away with costly and complicated machinery.

Especially designed for separating zinc from lead.

Solid Iron Tops, planed to a true surface.

All parts are interchangeable.

Wearing parts reduced to a minimum.

Capacity from 15 to 45 tons in 24 hours, according to class of ore.

Our illustrated catalogue contains all the latest information on the concentration of ores. Mailed on application.

THE COLORADO IRON WORKS CO.,

Established 1860. DENVER, COLO., U. S. A.

The "Stop for Repairs" to Mining Machinery,

Especially if it is a conveying plant, is a considerable item of expense. Many of these expensive pauses are made to repair or adjust faulty belting. To economize in this respect, use the

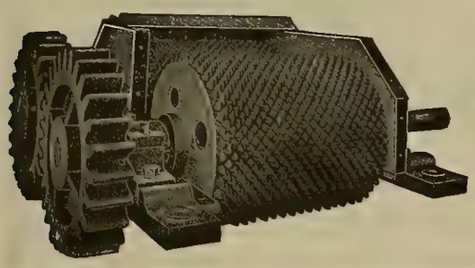
LEVIATHAN CONVEYOR BELT.

It is not only adapted to the heaviest service, but will run under any conditions in underground, drippings, extreme heat or cold.

IT WILL OUTLIVE ANY OTHER BELTING.

MAIN BELTING COMPANY,
1225-41 Carpenter Street, Philadelphia.
55-57 Market St., Chicago. 120 Pearl St., Boston.
SEND FOR PRICE LISTS AND SAMPLE.

LINK-BELT ELEVATORS —AND— CONVEYORS.



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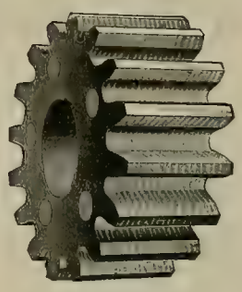

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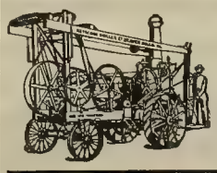

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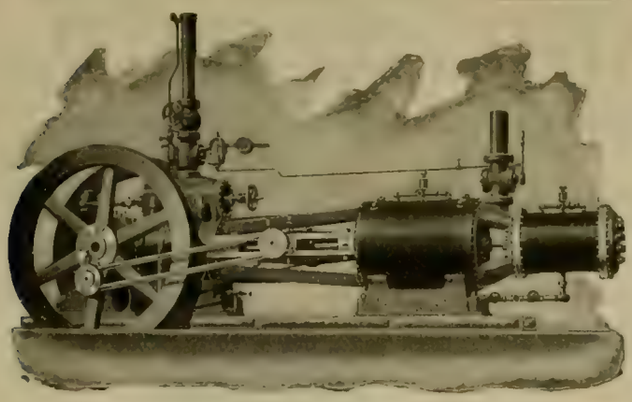

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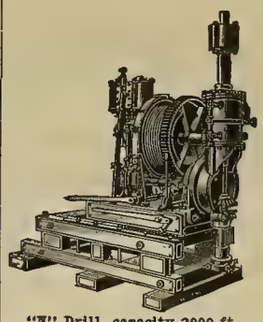

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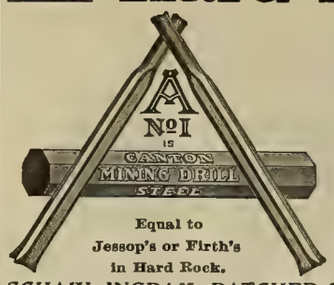

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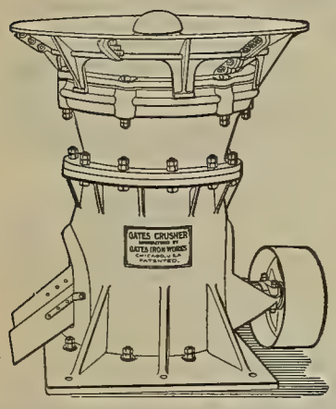

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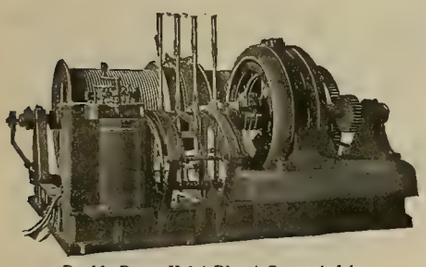

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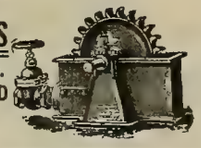

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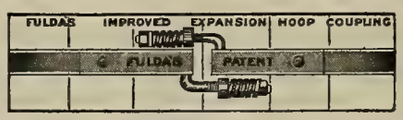

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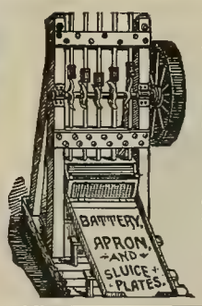

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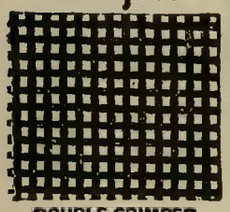

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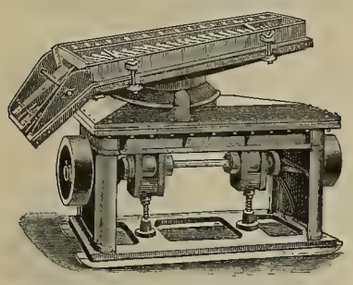

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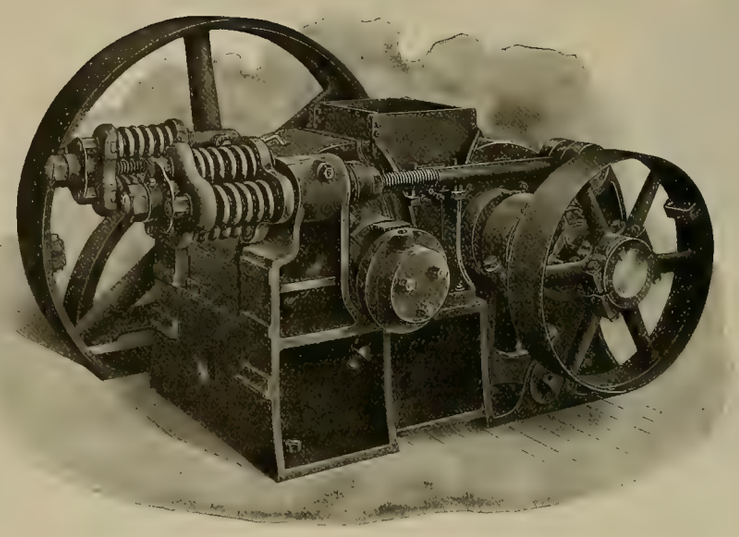

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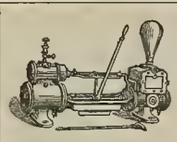

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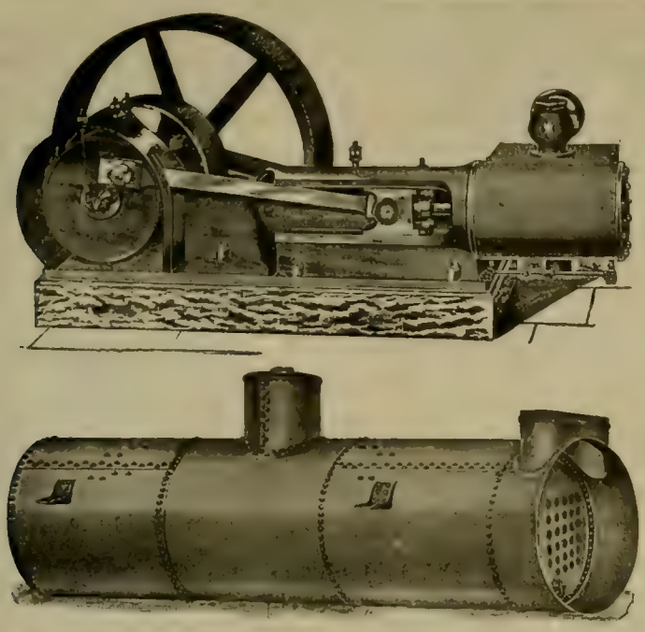

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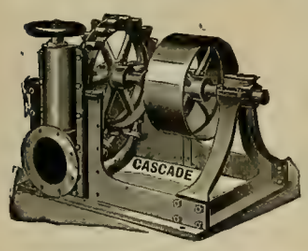

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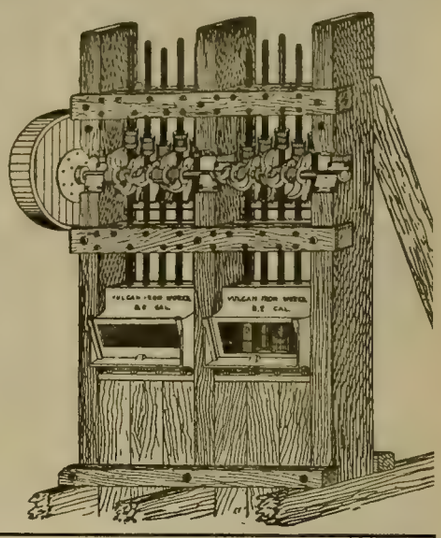

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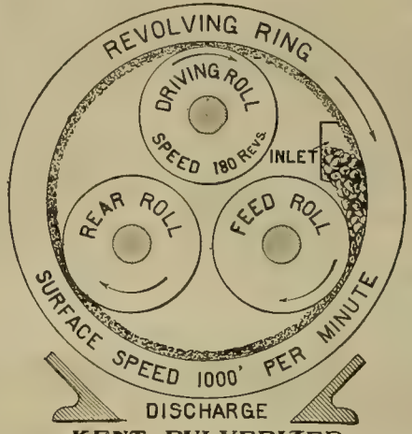

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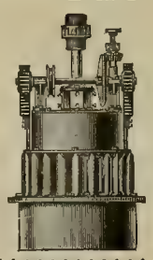

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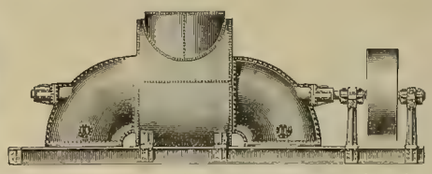

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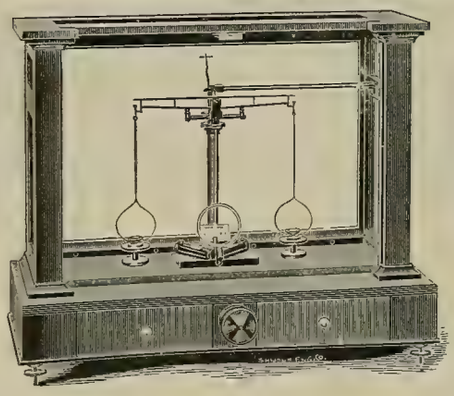

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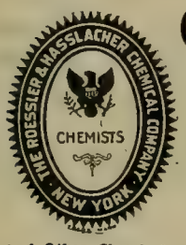

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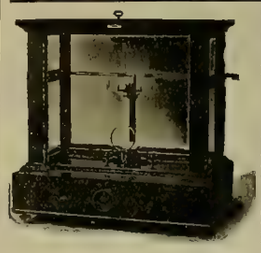

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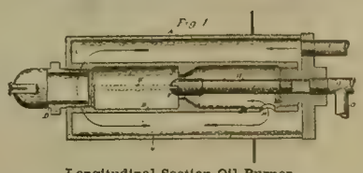

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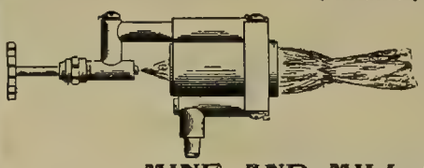

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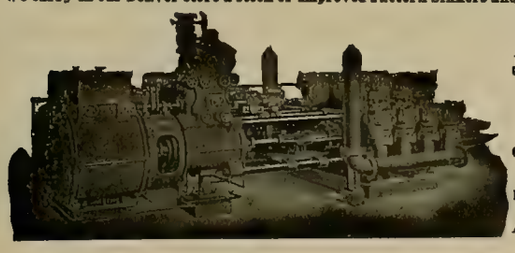

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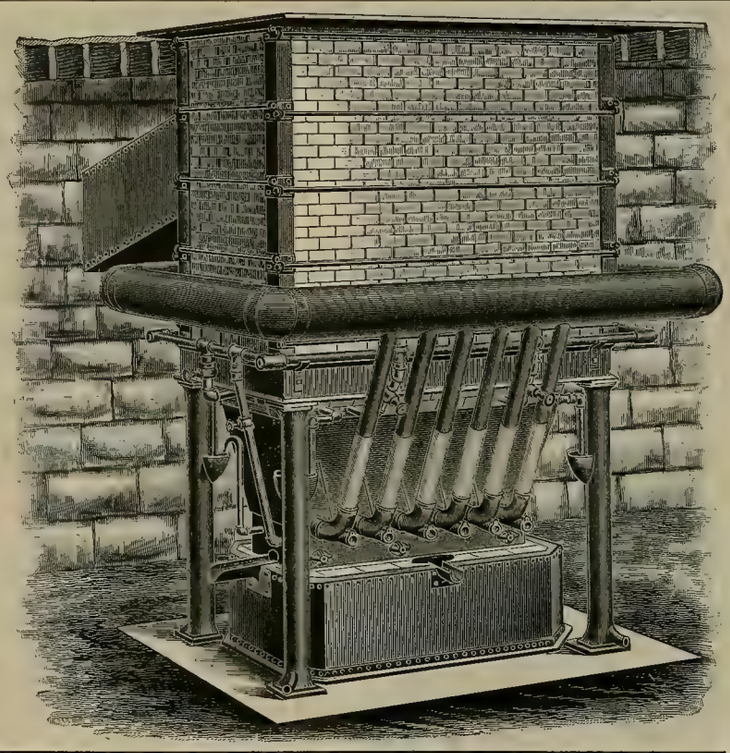

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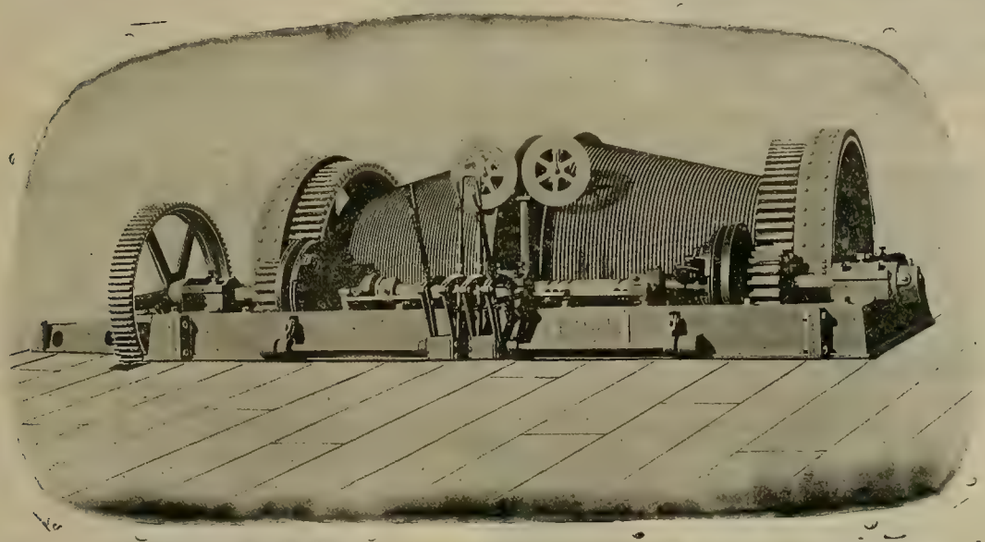

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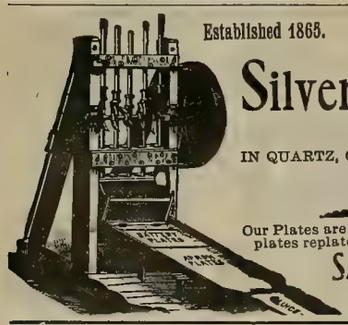

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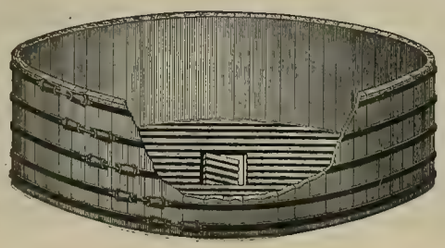

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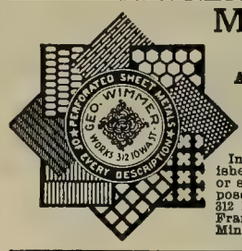

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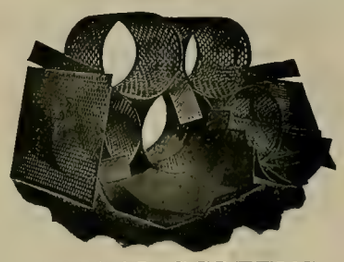

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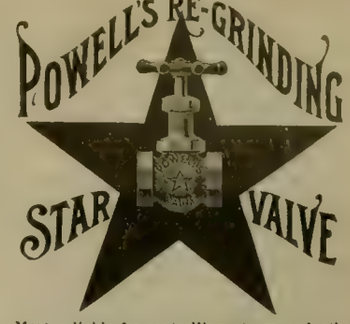

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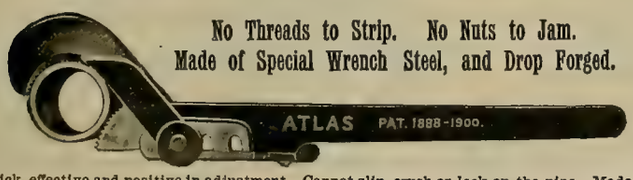

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ASSESSMENT NOTICES.

MARIPOSA COMMERCIAL AND MINING COMPANY.—Location of principal place of business, San Francisco, California; location of works, Mariposa County, California.

Notice is hereby given, that at a meeting of the Board of Directors, held on the 24th day of December, 1900, an assessment (No. 20) of Ten ($10) Dollars per share was levied upon the capital stock of the corporation, payable immediately in United States gold coin, to the secretary, at the office of the company, 320 Sansome street, room 24, San Francisco, California.

Any stock upon which this assessment shall remain unpaid on the 11th day of February, 1901, will be delinquent, and advertised for sale at public auction; and unless payment is made before, will be sold on SATURDAY, the 2nd day of March, 1901, to pay the delinquent assessment, together with the costs of advertising and expenses of sale.

By order of the Board of Directors.

JOSEPH H. MOOSER, Secretary.

Office—320 Sansome street, room 24, San Francisco, California

SILVER KING MINING COMPANY.—Location of principal place of business, San Francisco, California; location of works, Pioneer Mining District Pinal County, Arizona Territory.

Notice is hereby given, that at a meeting of the Board of Directors, held on the 13th day of December, 1900, an assessment (No. 22) of twenty-five (25) cents per share was levied upon the capital stock of the corporation, payable immediately in United States gold coin, to the secretary, at the office of the company, No. 310 Pine street, Room 36, San Francisco, California.

Any stock upon which this assessment shall remain unpaid on the 22d day of January, 1901, will be delinquent, and advertised for sale at public auction; and unless payment is made before, will be sold on TUESDAY, the 19th day of February, 1901, to pay the delinquent assessment, together with the costs of advertising and expenses of sale.

By order of the Board of Directors.

J. W. PEW, Secretary.

Office—310 Pine street, Room 36, San Francisco, California.

EUREKA CONSOLIDATED DRIFT MINING COMPANY.—Location of principal place of business, San Francisco, California; location of works, Placer County, California.

Notice is hereby given, that at a meeting of the Board of Directors, held on the 11th day of December, 1900, an assessment (No. 28) of one-half cent per share was levied upon the capital stock of the corporation, payable immediately in United States gold coin, to the secretary, at the office of the company, Room 31, 214 Pine street, San Francisco, California.

Any stock upon which this assessment shall remain unpaid on the 15th day of January, 1901, will be delinquent, and advertised for sale at public auction; and unless payment is made before, will be sold on TUESDAY, the 5th day of February, 1901, to pay the delinquent assessment, together with the costs of advertising and expenses of sale.

By order of the Board of Directors.

GEO. W. DIXON, Secretary.

Office—Room 31, 214 Pine street, San Francisco, California.

TANANA MINING COMPANY.—Location of principal place of business, San Francisco, California.

Notice is hereby given, that at a meeting of the Board of Directors, held on the 20th day of December, A. D. 1900, an assessment (No. 2) of ten cents per share was levied upon the capital stock of the corporation, payable immediately in United States gold coin to the secretary, Edward H. Stearns, at his office, Room 801 Claus Spreckels Building, Cor. Third and Market Sts., San Francisco, California.

Any stock upon which this assessment shall remain unpaid on the 15th day of February, 1901, will be delinquent and advertised for sale at public auction; and unless payment is made before, will be sold on WEDNESDAY, the 6th day of March, 1901, to pay the delinquent assessment, together with the costs of advertising and expenses of sale.

By order of the Board of Directors.

EDWARD H. STEARNS, Secretary.

Office—Room 801 Claus Spreckels Building, Cor. Third and Market Sts., San Francisco, California.

YUBA RIVER GOLD DREDGING COMPANY.—Location of principal place of business, San Francisco, California; location of works, Smartsville, Yuba County, California.

Notice is hereby given, that at a meeting of the Board of Directors, held on the 4th day of January, 1901, an assessment (No. 2) of three cents (3 cents) per share was levied upon the capital stock of the corporation, payable immediately in United States gold coin, to the secretary, at the office of the company, No. 214 Pine street, Room 29, San Francisco, California.

Any stock upon which this assessment shall remain unpaid on the 9th day of February, 1901, will be delinquent, and advertised for sale at public auction; and unless payment is made before, will be sold on TUESDAY, the 5th day of March, 1901, to pay the delinquent assessment, together with the costs of advertising and expenses of sale.

By order of the Board of Directors.

ALBERT CERF, Secretary.

Office—No. 214 Pine street, Room 29, San Francisco, California.

DELINQUENT SALE NOTICE.

AMERICAN OIL AND REFINERY COMPANY.—Location of principal place of business, San Francisco, California. Location of works, Contra Costa County, California.

NOTICE.—There are delinquent upon the following described stock, on account of assessment (No. 2) levied on the 26th day of November, 1900 the several amounts set opposite the names of the respective shareholders, as follows:

Names.	No. Cert.	No. Shares.	Amt.
Abbott, William	720	50	2 50
Abbott, William	721	50	2 50
Abbott, William	722	50	2 50
Abbott, William	723	25	1 25
Abbott William	734	25	1 25
Anthony, J. C., Trustee	797	1,000	50 00
Anthony, J. C., Trustee	798	1,000	50 00
Anthony, J. C., Trustee	799	1,000	50 00
Anthony, J. C., Trustee	973	1,000	50 00
Anthony, J. C., Trustee	1021	4 300	215 00
Dignan, J. P.	1039	1.000	50 00
French, Mrs. Mary L.	385	2	10
Goodenough, S.	1046	380	19 00
Holbrook, W. E., Trustee	897	10 000	500 00
Holbrook, W. E., Trustee	898	11,000	550 00
Holbrook, W. E., Trustee	899	4 500	225 00
Holbrook, W. E., Trustee	900	4,500	225 00
Kielhofer, Mrs. Louis	298	2	10
Kraehmer, Louis L.	471	3	15
Laird, Mrs. L. N.	230	5	25
Lord, Mrs. Leona E.	327	2.000	100 00
Lucas, Mrs. T. R.	348	10	50
Mayer, Mrs. L.	406	800	40 00
Massey, James B.	914	1	05
McKeavey, Mrs Angel na	71	12	60
McAllister, H. L.	1071	100	5 00
Pope, Wm.	656	50	2 50
Pope, Wm.	695	20	1 00
Pope, Wm.	764	30	1 50
Pope, Wm	908	20	1 00
Raht, Julia F.	321	25	1 25
Raht, Julia F.	453	40	2 00
Rachel, Mrs. Eliza	856	400	20 00
Royce, Lizzie A.	441	5	25
Russell, G. E.	125	3	15
Stover, W. M.	1047	480	24 00
Truitt, J. J.	399	5	25
Walser, Mark	858	1,000	50 00
Walser, Mark	859	1,000	50 00
Walser, Mark	860	1,000	50 00
Walser, Mark	861	1,000	50 00
Walser, Mark	863	500	25 00
Walser, Mark	867	500	25 00
Walser, Mark	868	500	25 00
Walser, Mark	869	500	25 00
Walser, Mark	870	500	25 00
Walser, Mark	871	500	25 00
Walser, Mark	872	500	25 00
Walser, Mark	921	50	2 50
Walser, Mark	926	5,000	250 00
Walser, Mark	927	5,000	250 00
Walser, Mark, Trustee	596	500	25 00
Walker, Mrs. S. E. D. E.	375	120	6 00
Young, R.	761	328	16 40

And in accordance with law, and an order from the Board of Directors, made on the 26th day of November, 1900, so many shares of each parcel of such stock as may be necessary, will be sold at public auction at the office of said corporation, in Rooms 322-323 Parrott building, San Francisco, California, on MONDAY, the 28th day of January, 1901, at the hour of 1 o'clock P. M. of said day, to pay said delinquent assessment thereon, together with costs of advertising and expenses of sale.

J. C. ANTHONY, Secretary.

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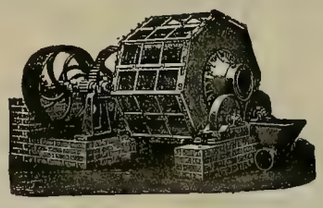

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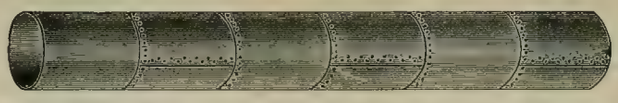

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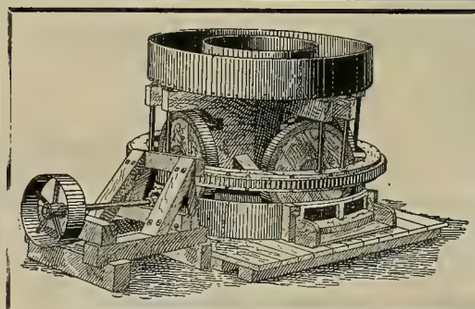

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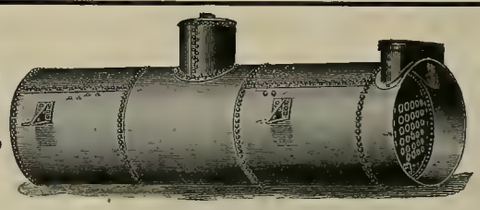

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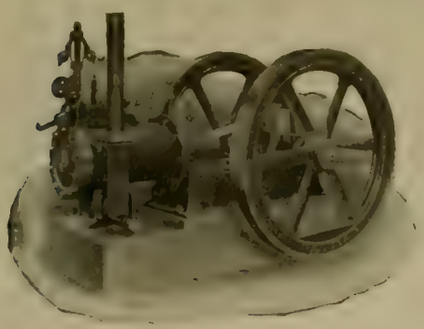

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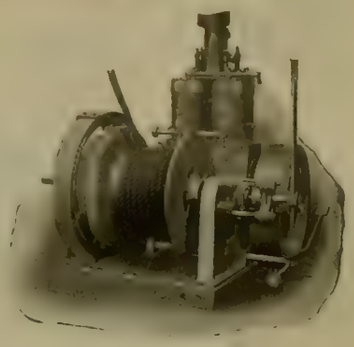

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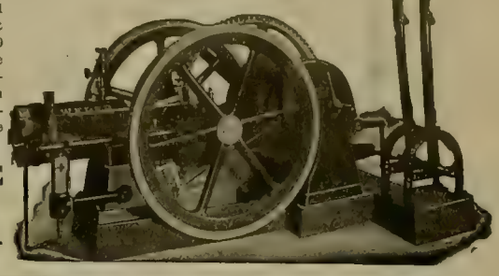

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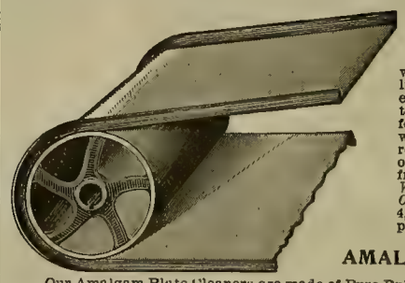

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This illustration shows the edge flanging outwardly as it passes over the pulley. This relieves the strain from the top and bottom of the edge by directing the strain automatically to the inside face surface of the edges. Heretofore all belts have been so constructed that when they pass over the pulleys or rolls, a direct strain comes upon the top or at the base of of the edges, causing the edges to break away from the body of the belts in a very short time. *We avoid this Mechanical Defect by our Spadone Curved Edge.* Belts made to fit any machine—4, 5 and 6 feet wide. Prices and samples on application.

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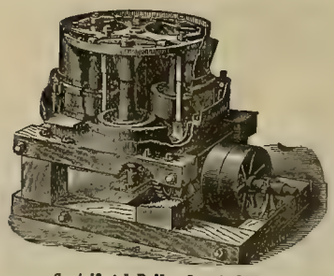

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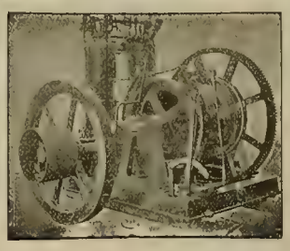

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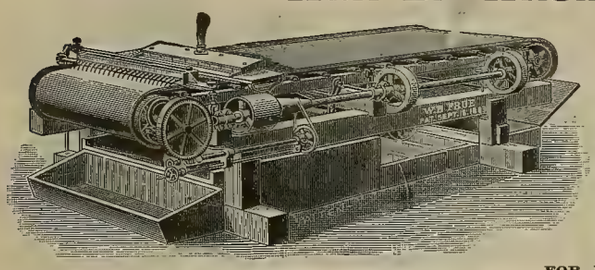

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The results obtained by this machine are the "acme" of concentration, and several cheap and untried machines that have lately come on the market compare by it. The manufacturers will tell you that they are "just as good, and cheaper," etc. The facts are that no other concentrator made has an equal capacity, or will yield as clean a concentrate with as small loss in the tailings as the Frue Vanner. The amount saved from the lower first cost of an inferior machine counts little in the year's results, when compared with the increased output from a Frue. This machine not only gives better results at both ends of the belt (i. e., clean product and poor tailings), but is operated at less expense and requires less attention than any other machine on the market. At the Alaska-Treadwell mine, where they have ordered over 350 Frue Vanners, one man attends 48 machines for 12-hour shift.

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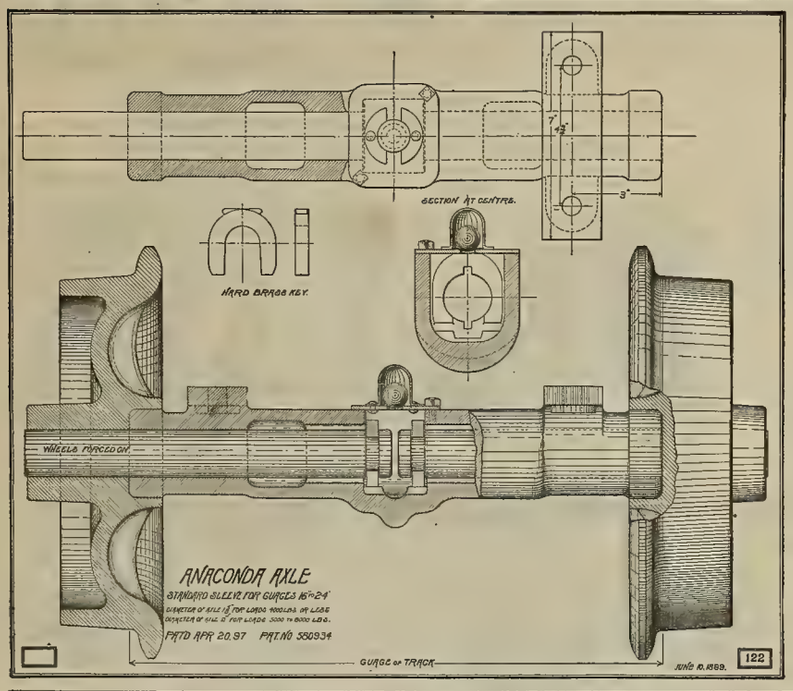

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Over 5000 cars equipped with these axles are being used by the Anaconda Copper Mining Co. in Montana, and large numbers are in use at other mines in the Western States. Axles are made to suit any gauge from 18-inch to 40-inch. Wheels of any type or size can be supplied. The wheel usually furnished is 12-inch in diameter with chilled tread, of form as shown in cut.

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MINING AND SCIENTIFIC PRESS.

Whole No. 2113.—VOLUME LXXXII. Number 3. SAN FRANCISCO, SATURDAY, JANUARY 19, 1901. THREE DOLLARS PER ANNUM. Single Copies, Ten Cents.

Technical Education.

In every technical journal technical education is being discussed. All concede its advantage, some claim more merit for it than the degree of value to which it is justly entitled, and others decry the methods of imparting it. While it is undoubtedly true that a student often leaves a technical school seriously handicapped by theories and ideas unaccompanied by practical knowledge, yet it is equally true that the embryo mining or electrical engineer or metallurgist can acquire directness of method, utility of time and knowledge of fundamental requirements better in a technical school or college course than he can in any other way.

The merits of American technical schools are manifest. As compared with similar European institutions, their results are at least equally satisfactory. They do not tend, as do many of the Old World technical institutions, to contemptuous feeling for the practical, and to a state that results in the commercial aspect of the case being despised by the professors. It was an English mathematician who is said to have thanked God that his science was one which could not be prostituted to any useful purpose. Prof. Adolf Slaby, a noted German authority on electro-technics, says: "Practical teaching is abhorred by the professors at most of our universities. I recollect attending a lecture by Helmholtz where I expected him to give some explanation of the dynamo. After making some theoretical observations, he merely said: 'Acting on these principles people have constructed some very ingenious machines called dynamos, for engineering purposes.' That was all Helmholtz would deign to say about the dynamo. The professors of to-day are just the same in this respect. Their teaching is purely scientific, philosophical, philological and historical and has not varied for three centuries." While Prof. Slaby exaggerates in the above statement, yet it is of common knowledge that many professors in colleges affect a disdain for anything beyond the domain of "pure science," or turning laboratory results to practical account. Still there are many bright men instructing in technical schools, as progressive and practical as the most advanced devotee of applied science could desire. The technical school has more virtues than faults and is an important factor in the nation's industrial progress. The ideal technical school would probably be one attached to a factory where young men could be systematically taught their business and the application of any department of science to their especial trade.

Room in Native Miner's Home on Panay Island; Finished in Mahogany.

Native Miners Watching Soldiers at Target Practice.

An American Garrison.

An American in Manila, P. I.

MINING IN THE PHILIPPINES. (See Page 48.)

Improved Steam Appliances.

On this page are illustrated two patent steam appliances, one the Crane low water alarm, Fig. 1, the other, Fig. 2, the Crane blow-off valve. As long as the water does not go below the low water line, the water in tube B prevents the steam from reaching the fusible plug. The moment the water falls below the low water line, the steam will rush in and fuse the plug C, thereby allowing the steam to escape through the hole in the wheel, which raises lever D, opening valve in whistle F, thereby allowing steam in pipe E to give the alarm. To renew fusible plug, close valve G, unscrew nut C, and insert new gasket. Then replace nut C, allowing pipe B to cool before opening valve G. Then remove the key I, which indicates that valve G is open and ready for operation again. Valve J should be open only when testing. When testing, open valve J, allowing live steam to pass into pipe B, which will melt the gasket. This should be done once a month. In the blow-off valve the valve seat is outside, which prevents sediment lodging at this point. The projection on the under part of the disc prevents any discharge taking place until the seats have become widely separated, preventing wire drawing. This valve should always be connected from the pressure side.

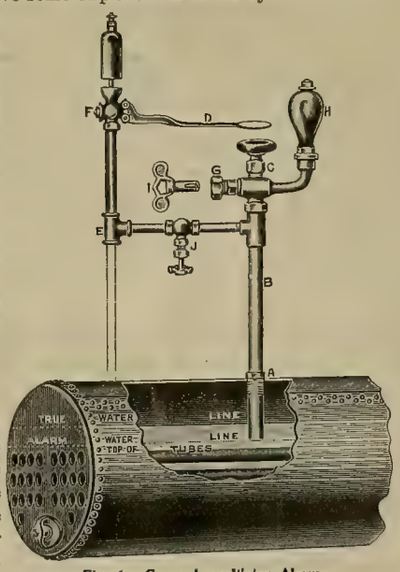

Fig. 1.—Crane Low Water Alarm.

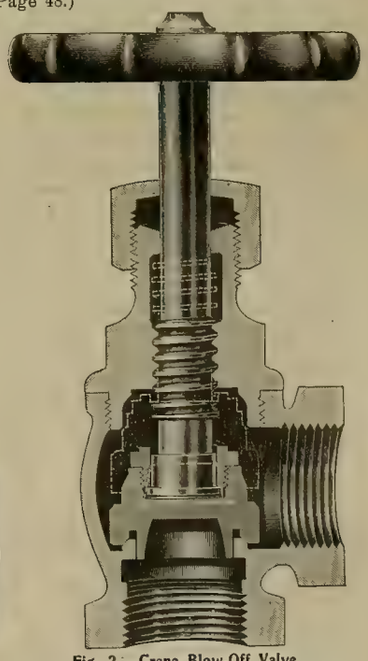

Fig. 2.—Crane Blow-Off Valve.

MINING AND SCIENTIFIC PRESS.

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W. D. CURTIS.....223 W. Second St., Los Angeles, Cal.

San Francisco, January 19, 1901.

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TAOS, NEW MEXICO, is trying to have a miners' hospital. Several States and Territories have at times taken up this commendable idea in a vigorous way, and some have even gone so far as the State of California, which passed a law authorizing and legalizing such an institution, but so far no public hospital of that nature exists anywhere in this country, though there are several reasons why there should be such a State or Territorial institution in several of our mining commonwealths.

IN a recent issue editorial comment was made on the closeness of competitive bids on large electrical engineering contracts, as indicative of the exactness to which that science has attained, and figures were given in illustration showing that, in a work involving the expenditure of $36,000, there was little comparative difference between the highest and lowest bids. From government reports to hand, it would not seem, however, that the same degree of exactitude was feasible in other forms of engineering work. In the case of the bids for raising the wreck of the Maine in the harbor of Havana, there were five bids, the lowest being $80,000, the highest $735,000—a notable discrepancy.

THE great dividend-producing capacity of mining investments makes it interesting to note where those dividends go. In California the best paying mining enterprise sends its dividends to London. Other of the mine dividend producers of the State also send their handsome surplus to non-resident stockholders. In Montana, of the hundred million dollars paid in dividends, not one million has gone to Montana residents. In Idaho the case is largely the same; likewise in Arizona. In Colorado nine-tenths of the dividends paid go to residents of that State. Cripple Creek district has paid $18,000,000 in dividends. Of this, about $16,000,000 goes to Colorado resident mining men. Colorado is to-day the most prosperous metal mining State in the nation. Why?

IN a recent issue of the Journal of the Association of Engineering Societies is an account of the use of a lead pipe siphon, of economic interest. It was put in use at Bar Harbor, Me., last April and at the time of the report had been in constant use without recharging and without waste of water. It has no air chamber nor pump, is 1 inch diameter and has wiped lead joints. Formerly a 2-inch galvanized pipe with screw joints had been used, but not satisfactorily, because of constant breaks in the siphon action. It is understood that the lead wiped joints constitute the satisfactory improvement. It may also be assumed that the loss of head because of substitution of a 1-inch lead pipe for a 2-inch iron pipe was more than made up by the lesser friction due to the waste pipe discharge.

THERE seems to be as great an objection to some promoters' methods, on the part of Australian mining men, as exists in other parts of the world. At the last meeting of the Australasian Institute of Mining Engineers at Melbourne, the chairman, in the course of his remarks, said: "The great idea of many directly they got hold of a good property is to send it to London to be floated. This is generally done through some mining agent. Were it floated at £50,000 locally, every shilling, less brokerage and expenses, would go to the funds of the company; but in London the same company would be floated for £150,000, though no more working capital would be available. One property in Kalgoorlie, sold for £5000, was floated in London at £100,000, out of which only £20,000 ever reached the company itself." This almost equals the recent flotation of a Shasta county, Cal., copper property at $6,000,000 that cost the Boston promoter thereof $125,000.

THERE is a petition before the present California Legislature to take immediate and favorable action on additional appropriation this session of $150,000 for the work planned by the California Debris Commission for impounding mining and other debris, to the end that similar appropriation may be made by the Federal Government therefor. Congress has already appropriated jointly $250,000 with the State appropriation of equal amount. The United States Engineers' plans contemplate the expenditure of $800,000; $500,000 is available; $300,000 more is needed. The whole matter has been gone over carefully, and in extensive detail. The measure has the endorsement of all concerned, its necessity is universally understood, and it constitutes a business proposition that will doubtless commend itself to the affirmative judgment of the California Legislature. It is not a favor asked for or to be granted to the miners. It is to supplement former appropriation for a manifest State need, and the entire subject is commended to the California Legislature as a most worthy one.

THE incipient trade with Russia is of importance to American manufacturers. Russia realizes the superiority of American-made machinery and gives promise of being a prominent purchaser. Under wise arrangement articles manufactured in this country are admitted free of duty to Vladivostock and other Asiatic ports of Siberia and Russia. During 1900 the United States sold to Russia over $10,000,000 worth of manufactured goods direct. There is a present effort on the part of American beet sugar interests to prevent importation of that article from Russia by putting in force the Dingley tariff thereon. Such action would be unwise and would work hardship on American manufacturers with large quantities of incompleted Russian orders, for it is probable, should the Secretary of the Treasury enforce such import duty on beet sugar, Russia would retaliate by a duty of 25% or 30% on imports of American manufactures, which would be practically prohibitive, and tend to throttle the trade now growing. The $10,000,000 of 1900 is but an index to the possibilities of increase therein. The total value of sugar imports from Russia during the fiscal year ending June 30, 1899, was but $340,000. American manufacturers should take immediate action against this threatened check to their business by making such representation to the Secretary of the Treasury as will stay such prohibitive embargo.

A PARAGRAPH on page 48 of this issue takes the stand that success in managing a mine is largely to be measured by quick work in getting all its ore out. While this is not to be wholly gainsaid, yet there may be conveyed by the paragraph an erroneous idea. The quality of quickness is not inferior to that of thoroughness. It is not uncommon for a mine manager to make a record for quickness and cheap extraction of ore, the latter so phenomenal as to attract general attention, and yet, as a good mine worker such a manager is not always a success viewed from any standpoint. Indeed, viewed from the base and sordid standpoint of financial profit, he may at times be a failure when the mine as an entirety is taken into consideration. A prominent mining manager in a letter to us on this very subject expresses the right idea. He is now managing a mine formerly operated by a superintendent who achieved a wonderful record for quickness and cheap extraction of ore. He says: "When one mines for the day only, and with no thought for the life of the mine beyond making a cheap record for cheap extraction, it is sometimes unsatisfactory for his successor," which is a mild way of intimating a good deal that might be said in connection with the paragraph, but which would be unnecessary to those who could understand it and useless to those who could not.

IT is not uncommon for a prospector or experienced miner to honestly over-rate the value and extent of a copper prospect if he goes on the common belief that the discovery of ore presupposes the existence of a vein or continuous deposit. It is not unusual in California to find in probably fifty of its fifty-seven counties nodules of copper ore in limestone, serpentine, porphyry or schist formations; and while these little ore pockets naturally arouse hope of value in development, yet it is often the case that the most promising surface indications in that regard prove delusive. In one example of such circumstance—the Copper World claim, near Ivanpah, Cal.—there was an ore exposure, solely limestone with infiltrated iron and copper oxides, carrying 6% copper in one part of the claim; in another part ore of better quality was found scattered over a surface area of 80x250 feet, and the apparently well-founded justification for extensive development work occasioned the expenditure of considerable money. This is a type of similar instances in various parts of the Pacific Coast. Sometimes such prospects have afforded ground-work for the most plausible prospectuses issued by promoters of companies, the more plausible and specious because so much regarding merit and value could be truthfully said. Where a mining engineer can say without deviating from the exact facts that there are 10,000 tons of chalcopyrite outcrop averaging 10% copper in a property under discussion, it gives good ground for the promoter to do some fancy figuring that could serve meretricious purpose with unthinking observers. In these days of extensive copper research and expansive copper promotions it is no harm to bear those facts in mind.

FROM Mr. Seligman, the Guggenheims' financial agent, is learned that the absorption of the Guggenheim smelting plants by the American Smelting & Refining Co. has at last been accomplished. Colorado advices regarding the big deal are to the effect that there will be considerable change in administrative and executive methods, some of which are in accordance with the terms of agreement, and others resulting from the logical carrying out of the same principles that suggest or justify the entire system of consolidation. It is asserted that the abolishment of general managers of the several plants has been decided upon, and that instead each smelter is to have a superintendent, who is to report to headquarters at Denver to J. B. Grant, chairman of the operating board. The idea of such abolishment of the several managers is figured to save about $250,000 annually, and the credit or the onus of such policy is given to the Guggenheims, who are announced to have insisted upon such policy as an essential part of the terms by which they agreed to be absorbed by the trust. It is also intimated that other decapitations will follow, to the extent of making a total annual saving of salaries to the amount of $500,000. This policy had already been determined upon, and the pooling of the Guggenheims furnishes a convenient time in which to make it effective. Daniel Guggenheim will be chairman of the board of directors, with headquarters in New York City; E. W. Nash of Omaha, Neb., will continue to be president of the company. With the exception of some sporadic concerns in Colorado, this aggregation takes in nearly all the custom smelters of any magnitude except those on the Pacific coast. The latter will continue to operate independently. It is understood that the Guggenheims are given 35% of the $100,000,000 capitalization of the company.

Concentrates.

WATER at 60° F. weighs 62.5 pounds per cubic foot; at 150° F., 61.16 pounds per cubic foot.

THE one billionth minute since the beginning of our present system of chronology will be reached at 10:40 A. M. April 30, 1902.

TO lubricate the cylinder of the gas engine try finely pulverized graphite fed into the cylinder through the suction pipe with the air and gas.

FINE wire cloth will help in making a lasting steam-tight joint with putty or rubber. It helps to hold the material together, preventing its being blown out.

WITH a well proportioned charge of gas and air, and a well ventilated mine, the fumes from the exhaust of a gas engine should not constitute a serious detriment to its use.

TO HARDEN a steel tool for a special purpose, heat it to a cherry red, drive the point into a cake of lead, and leave it there until it is cold. It will prove to be hard and tough.

WITH dry bituminous coal the chimney gases in case of perfect combustion would be by weight: nitrogen, 70.7; carbonic acid, 25.6; water, 3.7; by volume, 79, 18 and 3, respectively.

THERE is a California law that corporations therein shall have monthly pay days for employes, but was held to be unconstitutional in the case of Johnson vs. Goodyear Mining Co., 127 Cal., page 4.

THE largest square that can be got out of a round piece of metal is found by multiplying the diameter by .7071. From a disc 1¼ inches diameter could be cut a square piece .8838 inch in diameter.

MANGANESE BRONZE in the form of sheets, for mining screens, is sometimes used, acid mine waters having no action on it. For rolling into sheets a mixture containing more copper and less manganese is now employed.

THE whole matter of petroleum in California was the subject of specially written articles thereon by experts, illustrated with original engravings, in the issues of 1899 and 1900. A limited number of any issue can be furnished on request.

THE whole science of balancing is founded on the axiom in dynamics that no motion of mass can occur without a compensating motion of mass in an opposite direction, so that the common center of gravity shall remain undisturbed.

ACCORDING to the decision of the International Congress of Electricians which met at Chicago in 1893, the ampere, or unit current, is one which deposits silver from a solution of a silver salt at the rate of 0.001118 grammes per second.

WHERE the cylinder of a gas engine is 4 inches in diameter, and the stroke 5 inches, the nominal horse power is 2½. A Corliss engine, cylinder 22 inches, stroke 42 inches, ninety revolutions per minute, boiler pressure ninety pounds per square inch, is capable of evolving under those conditions 380 H. P.

THERE is a Federal Court decision to the effect that, though the stakes and monuments as designated in a notice locating a mining claim were not visible at the time of a subsequent relocation, such fact does not vitiate the former location, if the law in all other essential requirements has been complied with.

TEMPERING of steel can be done in two ways: one by hardening it first on plunging into cold water and then drawing the temper, and the other by plunging the red hot steel into various liquids directly. The temperature of such fluids and their capacities of drawing off heat regulate the degree of temper obtained.

"CONCENTRATES" does not presume to discuss mining or scientific matters with new process men, promoters or other superior informed people, but attempts earnest effort to answer any question in its domain likely to be of practical value to the inquirer, though the effort to so answer such question may be unsuccessful or unsatisfactory.

THE temperature of battery water has been so exhaustively discussed herein that nothing could now be said new that would be good, or good that would be new. The sensitive qualities of mercury which make it available in amalgamation remain unchanged between ordinary points of temperature, and the degree thereof is not so important as its uniformity.

THE effect of the Caminetti law passed by Congress March 1, 1893, relative to hydraulic mining in California, is to prohibit such mining within the designated territory till the California Debris Commission determines if it can be resumed without material detriment to navigation. This it does upon petition and inquiry in each individual case officially brought to its attention.

AT Cripple Creek, Colorado, the miner may go up to his work from the town on an electric car, go down in the mine by an electric hoist, operated by electric signals, the shaft being kept dry by an electric pump, do his work by an electric light, talk to the town and thence to the world by an electric telephone, run a drill electrically operated, and fire his shots by an electric blaster.

THE distance from the equator to the north pole, measured on the sea level along the meridian that passes through Paris, was carefully surveyed, and when accurately determined was divided by 10,000,000. The result was found to be 39.37006 inches—39⅜ inches for all practical purposes. A bar of platinum was made exactly the required length, as this metal is affected but little by changes of temperature, and deposited in the archives at Paris, to be preserved as a standard measure.

THE question as to whether in Colorado a mechanic's lien will lie for articles furnished for a smelting plant depends to a considerable extent upon the intention of the owner to make them a permanent accession to the plant, and upon the use to which they were applied, which matters could only be determined by a detailed and accurate statement of all the facts on both sides.

A SUBSTITUTE for German silver can be made by the use of manganese, the different metals and their proportions being as follows: 67.25 copper, 18.50 manganese, 13.00 zinc and 1.25 aluminum. The color of the metal produced by this amalgamation is good for the uses to which it is put and resembles the article known by that name; it is said to be as strong as the German silver and has equal casting quality.

ELECTRICAL RESISTANCE may be defined as that property of a conductor which determines how much heat a given current will produce in a given time. If the heat be measured in calories, the current in amperes, and the time in seconds, the resistance may be found by: $R = \frac{4.2\,H}{C^2\,t}$. R = resistance in ohms; H = heat generated in the conductor; C = current in amperes; t = time in seconds.

STEAM, eighty pounds gauge (94.7 absolute), has at sea level a temperature of about 323.56° F., the atmospheric pressure being 14.7 pounds per square inch. At an altitude of 11,000 feet, the atmospheric pressure is 9.8 pounds per square inch, barometer 20 inches, and steam at eighty pounds gauge (89.8 pounds absolute) would have a temperature of 318.86° F.; hence, at the mine at Sierra Blanca, Colo., proportionately less heat would be required to obtain steam at eighty pounds gauge pressure than at sea level.

GRAPHITE is used for many manufactures in its natural impure state. It is purified for other uses by first being ground or otherwise reduced to a state of fine subdivision. The next operations are washing out the heavier impurities, mixing fourteen parts with one part of potassium chlorate and two parts of concentrated sulphuric acid, heating on a water-bath for some hours, washing thoroughly and afterwards roasting at a red heat. If silica is present a treatment with hydrofluoric acid is added to the process.

TREATMENT of gold ores with a weak solution of cyanide of potassium was known in 1866. Volume XLI of the American Journal of Science, 1866, page 222, contains a paragraph in a letter written by Dr. Henry Wurtz, wherein he distinctly mentions the obtaining of gold in solution by the action of cyanide of potassium. As far back as 1843 Prince Pierre Bagration described in the Bulletin de l'Academie des Sciences de St. Petersburgh some experiments with finely divided gold dissolved in "an aqueous solution of potassium cyanide," in which he "succeeded in precipitating the precious metal."

THE leather can be fixed so firmly to the metal that the former can not be separated from the latter without tearing: Intimately mix one part by weight of coarsely crushed gall nuts with eight parts by weight of distilled water for about six hours, and filter through linen. Prepare a concentrated glue solution by pouring one part by weight of cold water over one part by weight of glue; let that stand for twenty-four hours; then heat the solution, coat the leather with the warm gall nut extract, put the glue as prepared on the roughened and warmed metal, lay the leather on it, press firmly, allow to dry in the air.

SPIEGLEISEN and ferro-manganese are both used in making steel; the difference between them is mostly in grade, Spiegeleisen is pig iron containing varying proportions of manganese up to 30%, usually between 20% and 30%. Pig iron containing from 30% to 60% manganese is low-grade ferro-manganese and over 60% Mn, high-grade ferro-manganese. The usual commercial standard for high-grade ferro. is 80%, and it is quoted on that basis. The usual commercial standard for manganese ores is 50% metallic manganese. Some large steel companies take ores as low as 40% as manganese ores. Most of the ore imported runs about 50%.

IN telephonic communication, the sound waves produced by the voice of the speaker cause the diaphragm of the transmitter to vibrate. The vibrations have the same period as the waves of the voice. The vibrations of the diaphragm cause the electric current through the line to vary in the same periods. The variation of the electric current sets the diaphragm of the receiver into vibration, and this vibration is received by the ear of the listener as sound. The voice is not transmitted. A current of electricity is transmitted through the line. A voice can not be heard a long distance. It is noticeable that the vibrations of the diaphragm of the receiver reproduce the qualities of the voice of the person speaking so perfectly that the person can usually be recognized by the reproduced tones.

THE crushing power of a stamp depends partly on its weight, and, further, on its momentum. There is a narrow limit for the height of drop of heavy stamps. As shown in last week's issue, a lighter stamp with higher drop will acquire a momentum that will entail equal crushing capacity. There is greater flexibility in the adjustment of a stamp battery that has a range of 4 inches in drop than in one where there is a range of only 1½ to 2 inches. While there are many individual cases where great weight is desirable, the working conditions of a battery with stamps of over 1000 pounds are limited, and the mill man is correspondingly restricted. As in everything else connected with the treatment of gold ores, each case needs special experiment and adaptation. As a general rule, however, if any mistake be made 'tis better to have the stamp too light than too heavy.

TO CALCULATE the power of a gas engine, let D represent the diameter of the cylinder in inches; L the length of the stroke in inches; R the revolutions per minute of the crank shaft; H the delivered or brake horse power of the engine. Then for a two-cycle engine the formula would be: $H = \frac{D^2 \times L \times R}{13{,}500}$. For a four-cycle engine the formula would be: $H = \frac{D^2 \times L \times R}{18{,}000}$. That is, multiply together the square of the cylinder diameter, the length of the stroke, and the speed in revolutions per minute; divide the product by 18,000 to obtain the horse power of a four-cycle engine, and by 13,500 to get the horse power of a two-cycle engine. Our inquirer must, however, bear in mind the difference between indicated and actual horse power.

CONCERNING the right of a gold dredger to operate in a river bed, in the case of a navigable river within the limits of any State the shores and bed thereof belong to that State, together with the contents. It is not to be assumed that any form of gold dredging in river beds would hinder navigation; indeed, there are gold dredgers on the Feather river, Cal., that are aiding in scouring the channel and making better the condition of that river, so far as navigability is concerned, but as against the State the gold dredger has no rights anywhere except by private purchase or legal placer location. Meanwhile, unless restrained by the State, he can operate, and in the absence of such State injunction or restraint he can act as does the fisherman. Of course, no one contemplating any extensive outlay would take any chances, the right to peaceful possession of the ground being as essential in this as in any other form of gold mining.

A VERY small amount of copper ore near the surface of a rock is able to stain it for yards by its carbonates and oxides. So, too, fissures in sandstone may have a vein of copper ore a few inches wide, and yet the walls on either side will become impregnated to such a distance that the first-sight observer would imagine he had a really valuable find. Absolute dependence cannot be placed upon the surface signs of the presence of copper-bearing ore, even where there is a heavy cap of iron oxide more or less spongy or honeycombed, and showing streaks of green carbonate of copper. At a little depth solid masses of green malachite and blue azurite may appear mingled, perhaps, with flakes of native copper and various oxides, such as black oxide, red oxide or cuprite, and copper glance. Where the ore or the enclosing rock is of a siliceous character, a turquoise bluish-green silicate of copper may occur, harder and of a different shade of green from the copper carbonate or malachite.

IN the case of Wilson vs. Triumph Con. M. Co., 56 Pacific Reporter, 300, the Utah Supreme Court decided that where a mining claim is located by an alien on unappropriated Government land, and all the acts necessary to a valid location are performed by him, and he and his representatives, claiming to be owners of same, perform the work necessary to keep the claim good until it is conveyed to a citizen, and no rights of third parties have attached prior to the conveyance, as between private citizens, the conveyance vests the title in the citizen, although the original locator was an alien. A qualified elector may relocate a mining claim in the possession of an alien who has not declared his intention to become a citizen, if relocation be made without force or violence, and prior to declaration of intention or conveyance to a citizen. Since the question whether the locator of a mining claim is a citizen of the United States can only be raised by the Government, it cannot be raised in an action of ejectment in a contest between individuals.

WHILE lightning may be seen and its illumination of clouds and mist recognized when even 200 miles distant, thunder is rarely audible more than 10 miles. The thunder from distant storms, therefore, seldom reaches the ear. The audibility of thunder depends not only on the initial intensity of the crash, but on the surroundings of the observer, even as in the quiet country one will observe feeble sounds that escape the ear in a noisy city. One curious and important condition of audibility is that the thunder wave of sound shall not be refracted or reflected by layers of warm and cold air between the observer and the lightning or by layers of wind, swift above and slow below, so as to entirely pass over or around the observer. Sound, in its wave-like progress obliquely through layers of air of different densities, is subject to refraction, and this refraction may occur at any time and place. Thus, observers at the topmast of a ship frequently hear fog whistles that are inaudible at sea level; those on hilltops hear thunder that cannot be heard in the valley; those in front of an obstacle hear sounds inaudible to those behind it. The rolling of thunder, like that of a distant cannonade, may be largely due to special reflections and refractions of sound. Again, the greater velocity of the air at considerable altitude above the ground distorts the sound wave and shortens the audibility to leeward, while increasing it to the windward.

Mining in the Philippines.

Written for the MINING AND SCIENTIFIC PRESS.

There is considerable mineral wealth in the Philippine Islands. The writer visited the principal mining districts recently and observed that most of the mines were in operation and on a paying basis. There are mines in operation in which various descriptions of ores are taken out in quantities varying from small lots, as handled by individuals, to the wholesale output of the mining companies and corporations. When the Americans first took possession of the islands, most of the mining was done on a crude and limited scale. Numbers of individual prospectors were in the field, and these men had considerable trouble in getting even small specimens of rich ores. There were many rebels, ladrones and cutthroats in and about the mining regions, and many a small mining party was cut off, killed and their properties looted. The remains of numerous mining huts can be found in the hills, and, if one takes the trouble to search the jungle in the vicinity, he will usually find the bones of one or more of the first miners of the islands, who were so unfortunate as to come here when there were few garrisons established and numerous guerrillas in the mountains. There may be some of the hidden treasure of the party found which escaped the notice of the thieves, and your correspondent has record of several instances in which little bags of gold, silver or other precious metal have been discovered in the soil or some rocky crevice near the ruins of a once busy mining camp. The mining of today is conducted with safety, however, for the American soldiers are distributed liberally over all of the islands, especially in the districts where there are many Americans or other foreigners working at the mines, plantations, forests or sugar mills. Then, in addition to the soldiery, there are the native forces of scouts, enlisted by the Government for the purpose of doing guard and patrol duty, identifying suspects, carrying messages and routing the freebooters of the the country. These native soldiers are under the command of American officers and non-commissioned officers, and are posted in and about the mining districts for the protection of miners and properties. Local native police—from 25 to 100—are stationed in nearly every mountain mining town, and these aid in the preservation of peace and order. The native scouts and police are all new institutions, and with their aid the miner is fairly well protected from the ladrones. If it were not for these protections, mining would be unsafe here, as it was previous to American occupation. At the present time there are many miners and mining concerns with capital at work in the hills, and, from all reports available at the present writing, most are making a good thing out of it, considerable ore coming in.

A large percentage of the gold and silver taken out of the Philippine mines is used in this country, for the people are very fond of jewelry, and the jewelers and makers of trinkets are all busy manufacturing various patterns of ornaments. Much of the gold, silver, copper and other ores are sent to the agencies in Manila, whence they are packed properly and shipped to foreign markets.

Gold, silver, copper, lead and zinc are being taken out of the mines on the islands of Luzon, Mindanoa, Panay, Gimeras, Negros and Cebu. The Spaniards operated many mines for years previous to the occupation of the islands by the Americans, but they did not go to work in the right way. Your correspondent visited many of the mines on Luzon, Panay and Mindanoa, which were once worked by the Spaniards, and found that the operations had been abandoned because of improper management. At first the miners were able to pick up considerable yellow metal on the surface. Also, the sands of the beaches produced finer gold dust, because of having been washed there through some river passing through the foothills of a mountainous section in which gold deposits existed.

But this sort of mining did not last; it was necessary to put in shafts; native labor was hired, and native labor can not always be relied upon for steady work. The better way was to hire the Chinese coolies, for there are two or three millions in the islands willing to work at from 10 to 12 cents per day in the mines or on farms, and these fellows can be relied on to work steadily. The natives have a habit of quitting work when they have made a little money and loafing until they need more. Besides getting gold and other of the higher grades of metals from the mines of these islands, iron and coal are taken out.

The condition of a country as regards roads always interests miners, especially a country in which the possibilities for mining are unknown. The roads have altered much during the past two years. When the writer first arrived here the roads were in very bad condition—hardly anything better than trails in the mountains—while the roads on the flat and low country were mud holes in the rainy season and in the dry season were so rough and dusty that traffic was carried on only with difficulty. The roads of the country have been worked upon by native prisoners for the past eighteen months with such good results that it is now possible for mining companies to make some headway. The companies for the first period of their existence used a good deal of their capital in the making of passageways through the jungle to connect with the main roads. Then, again, much money was spent in making rafts with which to ford the rivers, and, in some cases where the currents were strong, bridges had to be erected. Only the richer concerns were able to stand costs of this kind, so that in many instances the ores were carried from the mines to the sea coast by pack animals or by means of little bamboo drag sleds hauled by bulls, horses or caribou. In some instances the ores were moved by means of baskets, each one suspended to a pole placed across the shoulders of natives. The miners had to suffer many losses through the imperfect road system of the country, and for a time the expense of transportation consumed all of the profits and in fact caused numbers of the mines to be closed.

A system of internal revenue taxes has been in vogue in the islands for several months, and the income from these taxes is being utilized in the building of proper roads, repair and construction of the bridges and arranging for the traffic of freight across the islands. There is a large amount of sandstone and lime used in the construction work, and some of the lime quarries are paying well; they may be found in the interior of Panay and other islands in large numbers. I went through one section of Panay island in which there were hundreds of carts at work hauling to the seaport and for road work immense quantities of white limestone taken from the shafts cut into the sides of the hills. The natives work in these shafts, cutting out chunks of lime rock. Then there are the so-called sandstone mines, in which there are great mountains of this rock, which is soft, can be cut readily and shaped into cubes or slabs for transportation, but which is most excellent material for the building of roadbeds and for bridge work. In addition to the large numbers of persons and animals employed on the roads and hired with money from the tax collections, there are several thousand native prisoners, taken in battle with the Americans, who are working on the roads, thus serving out their sentences. These prisoners were not formerly all soldiers of the Philippino army, but were of the ladrone and outlaw classes, of which there were large tribes roaming over the islands, looting, killing and burning for a living. These large bands have been captured or broken up and the remnants put to work on the roads and bridges. All this road work is useful to the miners, for heretofore transportation of the output of the mines in many places was so hard that it did not pay to work the mines. I notice that several of the largest and best paying mines have been started recently as the result of the opening of new roads and the repair of some of the older ones.

The docks of the Philippines, except in the immediate vicinity of Manila, Iloilo and one or two other of the larger places, have never been in fit condition for service, and the miners have suffered severe losses as a result. The docks are either in ruins in many of the ports, due to neglect or long service, or there are no docks at all. Wharfage is scarce, and many a mining town which might be prosperous is quiet because of the lack of means for shipping ores. About a month ago, however, the famous harbor bill for the Philippines was passed, and now that there are about $1,000,000 available for the erection of wharves at needed points, it is reasonable to suppose that it will not be long before some of these deserted towns will flourish as soon as the mining operations begin. There is great difficulty experienced in landing native boats, especially in rough weather, and as only the low, flat beaches are found in many places, the difficulty in getting ore aboard is very great. I observed that in many of the seaport towns the basket carriers or the sleds drawn by cattle, loaded with ores from the mining towns in the hills, were brought to the water's edge and there loaded upon bamboo rafts. The natives would then paddle the raft out half a mile to a native boat and there effect the loading. This can be done only in good weather, for when the water is rough much of the ore is washed overboard from the rafts and lost. The establishment of dockage, however, will aid in getting the ore on the little native vessels and be of assistance to the miners.

Miners can not come into the mining sections of the Philippines and expect to find railroads in operation, as is the case in the principal mining districts of America. On the island of Luzon there are several lines of railroads, some of which tap the mining sections, but which are mostly arranged to reach the cocoanut districts, for the transportation of the cocoanut in the copra season is most profitable to the roads. On the island of Panay there is a little narrow-gauge railroad in ruins in the interior, built by the Spanish for moving iron ores. This road could be put into running order for a few thousand dollars. Some parts of the road merely require a little ballast. I saw several ore cars in perfect shape, except very rusty and soiled, dumped down alongside the road where they had been pushed, and there left to rot. Like everything bearing the Spanish mark, the road is going to ruins. Probably the road was first abandoned because some of the rails worked loose. The Spanish and the natives do not believe in making repairs. I have seen bridges closed to traffic because of a few planks having broken or rotted, and the public takes to the river, fording it. Men and women cross the river by wading or by a raft. If a piece of roadway is washed out, it will remain out of repairs for months before it is fixed. But there are Americans now in the islands, and some of these people see money in railroads for the commercial and mining sections. I have met with several representatives of rich American railroad corporations who propose to establish roads here in the near future. Certainly the roads will pay handsome dividends. The miner of the future may depend upon having railroads for transportation purposes; but for the present the native carts and native basket carriers must be depended upon.

The woods of the country, of course, concern the miner to some extent, for there are shafts to be built and protected, buildings to be constructed and other lines of work done requiring the products of the forests. There are immense tracts of land here covered with all descriptions of hard woods, and, as most of the forest lands are now Government property, the miner can secure all the timber he desires at the mere cost of hauling. I visited several woody sections in company with a mining engineer, and was surprised at the high-grade woods available. I saw that the men were selecting immense mahogany trees and using some of the timber for mining purposes, this being especially adaptable for certain work that the engineer had in view. He told me that it was as easy and as cheap to get mahogany as pine. In fact, pine is scarcer than the former. All of the soft woods are harder to find than the hard woods. Black walnut, ash and other woods are cut into large planks by hand, the natives doing the work, which is seemingly a costly way; but it is the only way, as there are no circular saws in operation in the Philippines, except in a few sawmills near Manila. The native wood sawers work for 15 cents per day, which, of course, makes the cost of labor low. There is a great chance here for some of the miners to put in lumber mills. The most inferior equipped lumber mill would pay a fortune here in a year. Everyone wants lumber, but can not get it, except the hand-cut sort, and one may judge what sort of cutting can be had when immense boards are sawed out by hand. The work is sure to be irregular and unsatisfactory. Then there are great delays in getting the boards, as it takes nearly all day to saw out one of the big ones. With the immense forests of wood available, and the great demand for lumber for mining and building purposes, a mining corporation would make considerable of an income by running an American equipped sawmill in connection with its regular line of business.

The work in the mines of the Philippines is greatly handicapped in consequence of the lack of proper machinery. The Spaniards tried to do some mining, and they failed in most cases because they lacked the necessary machinery. The miners who are operating in the hills at the present time are handicapped by having no proper outfits for carrying on the work as it should be done. The days of placer mining for gold are over, for the natives have always followed this line of work and have kept the hills thoroughly cleaned up. There is much to be done in quartz mining, and in the sections where they have crushing machinery the miners are doing well. All of them did not bring apparatus, however, and the result is that some of the mines are tied up. It is very difficult to secure the desired mining machinery at Manila or at Iloilo, where machinery and steam goods supply houses have been established, in which one can buy engines and boilers, ventilators, conveying machinery, oils, belts, water wheels and general mining tools; but the heavier and more costly equipments, such as crushers, concentrators, stamp mills and the like, are not to be had. In some cases the mining concerns have made attempts to operate foundries in which to cast the necessary gearing and framework for the making of the needed machines. I saw some of these homemade devices, and the castings were full of sand and blowholes, and the fittings were heating and grinding, regardless of being deluged in oil. The shafts, which were forged or taken from the ruins of sugar mills which had been burned by the insurgents, were warped and cracked, couplings failed to join evenly, and all of the machines thus made, as seen by your correspondent, failed to accomplish the work for which they were erected and had to be abandoned. There will in time be mining machinery houses in the islands, but for the present mining concerns should see to it that their orders for the required machinery are filled in the United States. ENGINEER.

Iloilo, Isle de Panay, P. I., Dec 1, 1900.

THE notable success as managers of American mining men over mining men of other countries is in quickly and successfully solving the problem. Given a certain amount of money locked up in a certain piece of ground, how can that money be extracted in the shortest possible time at the cheapest cost? A mine is nothing more nor less than a certain amount of money locked up in earthy material; the more quickly that money can be taken out the less interest will have to be paid on the capital invested in taking it out, and the sooner the profits realized can be turned into interest-bearing sums. It follows logically that the more quickly a mine is developed the sooner extraction can be begun.—Engineering Magazine.

Centre Star Mining Co.'s Report.

Through the courtesy of Mr. E. B. Kirby, the manager, is received the recently compiled report of operations in the Centre Star mine, Rossland, B. C., which gives some detailed information of general value. The following statement shows values and smelter charges per ton for year ending—

	Sept. 30th, 1899.	Sept. 30th, 1900.
Real or full assay value—total metallic contents at full N. Y. quotations....	$22 84	$20 14
Indirect smelting charge—difference between N. Y. quotations and smelter's prices for the metals.....	3 93	3 57
Direct smelting charge—including freight from the mine.....	6 00	6 00
Total smelting charge—direct and indirect.....	9 93	9 57
Smelter's gross assay value—after deducting indirect charges only.....	18 91	12 91
Smelter's net value—after deducting both the indirect and direct charges from the real assay value (i. e. net value of ore f. o. b. cars at mine).....	12 21	10 57

On Feb. 6, 1900, the mine closed down to permit the installation of new machinery. Mr. Kirby says:

"It was decided to take advantage of the opportunity afforded by the stoppage to make a radical change in the method of employing labor. The costs of mining during the preceding year were very excessive, and it had long been apparent that the principal cause of this unusual expense was due to the inefficiency of wage labor under the conditions prevailing in Rossland. The quantity of work done per man for the wages paid was not satisfactory. Repeated efforts had shown that it was impossible to make any satisfactory improvement under this system, and it was therefore decided to introduce the contract system, whereby miners would be paid according to the quantity of work performed, instead of by the time spent in doing it. On March 12th this system was presented to the employes of the Centre Star, War Eagle and Le Roi mines. At first many of the miners opposed the change, fearing that it would be injurious to their interests. The issue remained unsettled for several weeks, during which the mines were closed. On April 5th the question was settled amicably with the miners, who decided in favor of adopting the new arrangement proposed. As the new system had to be inaugurated by degrees, it was some time before the development headings were fairly under way.

"The reduction of costs effected by the contract system will appear in the cost sheet for the coming year. It does not show in the table of average costs for the past year. These are excessive, because most of the work represented there was done under the old wages system. Moreover, it includes the fixed and general expenses during a more or less complete stoppage of nearly three months, and a subsequent period during which little ore was produced. The results of the new system are now clearly established by the work of several months, and the improvement shown is even in excess of what was expected.

"In shaft sinking, 129 feet of contract work compared with the last 100 feet under the wages system, shows that the average rate of advance has been increased from 23½ feet per month to a present rate of 47¼ feet per month. The cost of drilling, blasting, shoveling and timbering shows a reduction from $65.30 per foot of advance to $44.30 per foot. This comparison is on a basis of three shifts (twelve men) daily, and a thirty-day month.

"In drifting, the rate of advance for headings has been increased from the former average of 52 feet per month by the wages system to the present average of 94 feet per month by contract. The comparison is on the basis of two shifts (four men) daily, per heading, and a thirty-day month. The cost of drilling and blasting shows a reduction from $8.03 per foot of advance to $5.41 per foot.

"In stoping, by contract the average ore broken per man per shift for the month of September is 14.4 tons. The former average, under the wages system, was 4.3 tons. The cost of drilling, blasting and explosives for the same period was 37 cents per ton of ore broken, against a former average of 94 cents per ton under the old system.

"The results of the new system have been equally satisfactory to the contractors, who have averaged good pay, considerably above the standard rate of daily wages."

Mother Lode, Cal., Mining Methods.*

The timbers employed in the mines of the Central Lode are uniformly large—18 to 30 inches in diameter—and the method of framing and placing them varies somewhat, but is usually, in the larger stopes, some modification of the system known throughout the world as the Nevada square-set. The placing of these timbers is accomplished often under great disadvantage, and, in some instances, with considerable evident danger. The men selected for this work usually represent the finest type of physical manhood, for no others could accomplish the arduous task expeditiously. As to the relative merits of the respective methods of framing these heavy timbers, it seems only necessary to say that those systems involving the least framing with ax and adz underground, and consequent smaller loss of time in placing timbers in position, are the methods best adapted to regular practice.

In some mines an objection is raised to the employment of sills on the main floor of a level, for the reason that the sills rot before the stopes can be carried through from any level to the next above. In most cases there is no excuse for this. A reprehensible practice, which is found almost universal in these mines, is that of attempting to carry up stopes of too large a superficial area, and this practice is responsible for some disastrous caves which have occurred in various mines. A stope of smaller superficial area can generally be carried from one level to the next above more quickly and safely than a large one, and in most cases, even by the present old-fashioned methods of mining, a stope of small sectional area may be carried through in a few months—long before the sills become weakened by reason of decay. If the development of the mine were carried on well in advance of the extraction of the ore, it would not be found necessary to open these large stopes, as a number of smaller stopes would supply the same amount of ore daily as is usually drawn from one, two or three large stopes, and it would be found that ultimately the cost would be materially less, as in most cases there would be no loss of ore, no disastrous caves, and work could be accomplished more expeditiously and more cheaply.

FILLING.—There are few veins on the Central Lode where, by present mining methods, filling is not absolutely necessary, though by the adoption of the lateral foot wall gangway system heretofore suggested, in some of the smaller mines, filling might to some extent be dispensed with, the walls being allowed to collapse after removing the ore. Material for filling is usually obtained from crosscuts and drifts driven in prospecting, and from chambers cut in the walls of the veins—generally the hanging wall. There are few veins on the lode so small as to make enough waste in stoping to fill the excavation. Ordinarily, all the rock removed from the pay shoot goes to the mill, and filling must be obtained elsewhere. In some of the larger mines, where the veins are of great size—40 to 100 feet or more in width—it is not uncommon to find the entire vein removed for a distance along its strike equal to and often much greater than its width, the entire area overhead resting upon the props reaching from the topmost set of timbers to the roof. There may be three, four or more floors in place, and the stope may be found filled from the sill floor to within a floor or two from the top; but it is clearly evident that in a stope of the size indicated this filling can afford but little if any support to the hanging wall, and none at all to the back of the stope. Failure to recognize this fact has resulted disastrously in more than one mine. The filling must be placed in such manner as to support the back of the stope over as large an area as possible, and a portion of this filling at least must be placed by hand, for it is clearly evident that should any subsidence occur in a stope approximating 100 feet square timbers cannot be depended on to support the great weight. In a stope having a width and length of 100 feet, and carried up four floors in height, there would remain between the top set and the floor of the level next above (65 feet) not less than 50,000 tons of ore. Should this become "dead weight," each post of the sets in place would have to sustain a load of several hundred tons of ore in addition to the weight coming from ore and filling in levels above, and to this must be added the greater pressure coming from the direction of the hanging wall. This weight, or pressure, will vary greatly in different mines, depending upon the character of the ground, the condition of the walls, and to no small extent upon the angle of dip of the vein. Were the enormous weight of this great shifting mass of rock equally distributed, there would be less probability of a cave; but often, the weight being transferred from point to point, owing to the mobility of the ground, the pressure upon some given point becomes greater than the timbers can sustain, and a single line of sets once forced out of position renders the remaining sets less secure than before, and general collapse results; and most miners are familiar with the dangers and extraordinary expense incident to the recovery of a caved stope and the extraction of the shattered masses of ore from the zone above the cave. In veins having vertical walls the danger of caves is much lessened, but the mines of the California gold belt dip at all angles ranging between 30° and 85°, the greater number being between 45° and 70°, below the plane of the horizon. This being the case, the pressure upon timber sets is exerted diagonally, and not directly downward upon the posts of the sets. Naturally this renders the square, or rectangular, sets less capable of sustaining the weight and pressure. In some mines diagonal braces are set in to take this hanging wall pressure more directly, but timber will not hold it.

In consideration of the above facts, the absolute necessity of filling becomes apparent, and the necessary preparation to this end should always be promptly made in order that the filling of the stopes be not too long delayed. Filling must be carried on contemporaneously with ore extraction; and in stoping the excavation should be carried upward in sections of relatively small superficial area, the filling being packed as close to the back of the stope as possible. Where the veins do not greatly exceed 15 feet in width, the conditions are essentially changed, as in such cases the stopes may be timbered with stulls set slightly above a right angle to the dip of the walls. Most mines, where the walls are sufficiently firm, are timbered in this manner when the distance between walls admits it.

The Bulletin here refers to the method of stoping and filling adopted by Supt. Uren at the Eagle-Shawmut mine, Tuolumne county, Cal. His plan is to put a long raise to the surface from a point above the tunnel level. This raise is driven at an angle of about 65° above the horizon, the slope being westerly. The formation and veins dip easterly at about 70°. The walls are usually firm and hard. The incline above mentioned reaches the surface in an open cut, where the rock, being barren, is suited for filling, and may be quarried cheaply. Stopes are started and mining operations continued by cutting out the ground the full width of the vein in the form of the letter A, the base being longitudinally of the vein and the angle at the apex being no less than 90° in order that the rock may readily run on the slope. The floor of this stope is heavily stulled and covered with lagging. The winze passes directly through the apex of this triangular stope, and waste is sent down from the surface and the excavation filled. Stoping then progresses in slices on alternate sides of the winze or raise. These slices are from 15 to 20 feet in height, the pay rock passing down through mill holes cut through from the level below, the ore chutes being carried up by cribbing, keeping even with stoping operations, and the filling run in first one side and then the other, until the block is worked out. The levels below are worked in similar manner, the filling passing through the stationary loading chutes (at the levels) and across the track into the next winze beneath by use of an apron, which may be removed when desired until again required. This method demands a minimum amount of timbering and renders the mine safe as far as caves are concerned. It may be elaborated and extended from level to level and make available a large amount of ore at a low cost of mining.

* Bulletin No. 18, California State Mining Bureau.

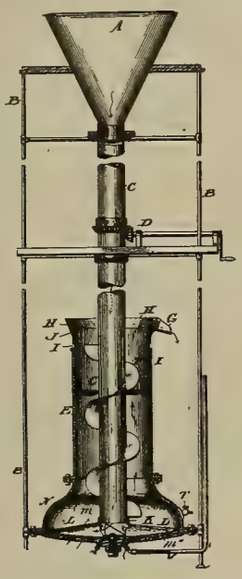
TABLE OF MINE COSTS FOR TWELVE MONTHS ENDING SEPT. 30, 1900.

	Development Work				
	Sinking Main Shaft.	Sinking Small Shafts.	Raising.	Drifting.	
Total advance, feet	228.5	103.5	903.5	2421	
Ore stoped, tons	.....	.....	.....	.....	20,490
Cost per foot.					Cost per ton.
Drilling and blasting	$ 24 70	$20 13	$16 77	$ 7 25	$0 70
Explosives	4 39	5 19	4 06	2 45	11
General mine supplies	2 78	1 47	1 76	92	12
Mine lighting—candles	74	41	47	25	03
Mine lighting—electric	90	..	17	20	02
Smithing	1 99	1 90	1 94	77	08
Trimming and shoveling—direct	10 12	..	31	74	14
Trimming and shoveling—apportioned	6 30	5 06	5 01	2 44	48
Timbering—labor	19 11	2 33	5 16	24	43
Timbering—material	5 31	50	70	05	13
Machine drill fittings	1 46	1 53	1 83	65	06
General mine labor	6 90	2 85	3 77	2 11	27
Hoisting—underground	10 44	8 69	..	..	..
Hoisting—main shaft	6 57	..	1 70	1 63	22
Compressed air	3 48	3 26	3 07	1 35	14
Mine ventilation	1 26	50	71	38	05
Assaying	12	13	32	24	05
Surveying	1 71	50	65	39	04
General expenses	15 35	4 56	7 61	4 76	52
Total	$123 63	$59 01	$56 01	$26 82	$3 59

Mining and Metallurgical Patents.

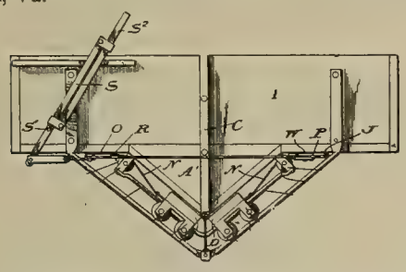
Patents Issued January 8, 1901.

AMALGAMATOR.—No. 665,418; G. W. Fisher, Louisville, Ky.



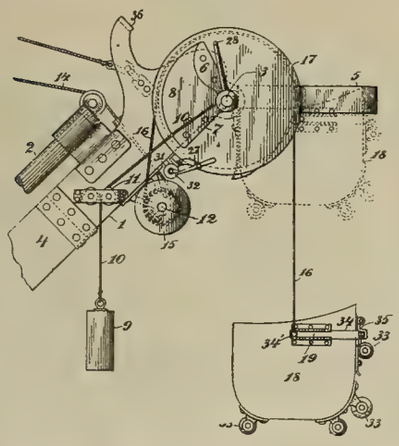
An amalgamator, consisting essentially of supporting frame, bowl with concave bottom, agitating wheel running close thereto, wheel having hollow arms joined at center, presenting sharp front edges in direction of movement open at rear sides or edges, vertical tube supported by frame, rigid with arms and communicating with hollow portions thereof, means for rotating tube and arms, all combined.

DUMPING CAR.—No. 665,431; J. L. Ham, Huddleston, Va.



In a dumping car, body portion with hopper bottom, angle tracks supported by car, projecting below bottom thereof, trucks having wheels running on tracks, doors secured to trucks designed to close over outlet to hopper bottom, means for raising doors.

HOISTING AND DUMPING APPARATUS.—No. 665,574; C. A. Morris, Glen Ridge, N. J.

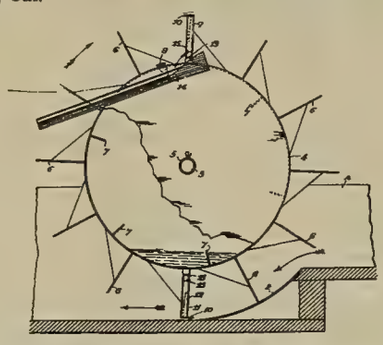


Combination with supporting frame, chute, dumping guide hinged in frame, means for supporting frame yieldingly in normal position, of counter shaft, drums thereon for hoisting and bucket ropes, bearing sheaves for bucket ropes rotatable concentrically with hinging axis of guide and bucket.

ART OF OBTAINING CHLORATES BY ELECTROLYSIS.—No. 665,426; W. T. Gibbs, Buckingham, Canada.

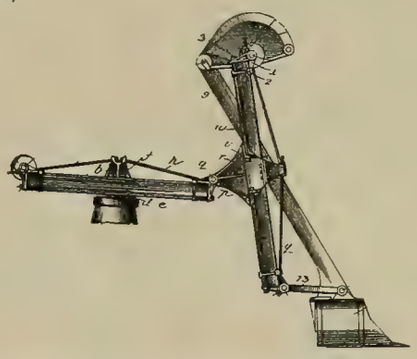
Process of obtaining chlorates from chloride of alkaline or alkaline-earth metals which consists in subjecting chloride in solution while flowing continuously through each of series of cells to action of electric current passing through cells in series, between two electrodes in each cell insulated from each other, but otherwise separated only by liquid, density of current used being such as to maintain solution in all cells at temperature high enough for decomposition of hypochlorites, and controlling temperature of solution in each separate cell by regulating flow of solution.

AUTOMATIC TAILINGS SAMPLER.—No. 665,620; W. Stephens, Redding, Cal., and J. P. Munger, Jamestown, Cal.



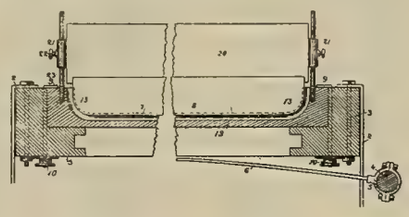
This invention is designed to collect samples of tailings or other material flowing through a sluice, and to deliver them into a receptacle where they may be tested to see whether the tailings are carrying off any unusual amount of valuable matter, or for other purposes. It consists of a wheel having paddles dipping into the current of flowing material, collectors carried by the wheel intermediate of the paddles, adapted to receive a portion of the passing material and separate it from the main body, said collectors being hollow, having slots or openings to their interior, and having at their outer ends plates projecting toward the approaching current so as to direct portions of the pulp into the slots or openings. A diagonally inclined plate extends from one edge to the other interior to the float and forms a discharge chute when the float reaches the upper part of its travel, and a receiving chute and collecting vessel are so disposed that the material is periodically delivered into it.

EXCAVATOR.—No. 665,685; O. Hetlesaeter, Chicago, Ill.



Combination of crane adjustable in direction of length; link-work bucket arm pivotally supported upon crane, one member constituting an oscillating lever, pivotally attached to crane, support for bucket arm, lever longitudinally adjustable upon support; second member extending in general direction of oscillating lever; thrust segment connecting upper extremity of oscillating lever with second member; connections between lower extremities of lever and second member; bucket attached to second member at lower extremity.

GOLD SAVING APPARATUS.—No. 665,773; F. J. Drake, San Francisco, Cal.

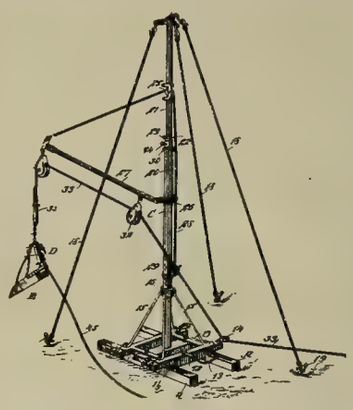


This invention relates to an apparatus which is designed to save gold and like heavy valuable material and separate it from the lighter gangue with which it is found associated. It consists of a longitudinally inclined horizontally shaking frame having transversely channeled sections supported upon the frame and vertically adjustable plates, the lower edges of which correspond in shape with the channels and dip therein. A receiving box is mounted upon the frame and movable therewith and has a supply pipe with a flexible section. A convex arched distributer is located within the box, upon the apex of which the material is received and caused to flow in divergent lines outwardly toward the sides of the box. The latter has a slot or channel through which material is delivered upon the upper unchanneled end of the uppermost section. The inclined frame has upon it a series of independently removable transverse sections supported thereon, these sections having the bottoms inclined coincident with the inclination. The upper surfaces are depressed, extending horizontally from side to side, having upward concaved curvatures, with correspondingly shaped channels of substantially uniform depth extending transversely across the upper surface. The tops of the intermediate ribs are horizontal in the direction of the length of the apparatus, and each succeeding one is slightly lower than the next preceding vertical side wall of the channel. Plates are secured to the sections dipping into the channels so that the material flowing through must pass beneath the jaws of these plates.

PROCESS OF TREATING SULPHIDE ORES.—No. 665,744; H. F. Kirkpatrick-Picard, London, England.

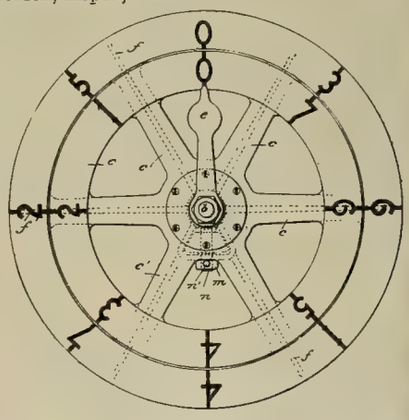
Treating sulphide ores containing silver, zinc and lead; roasting ore to form of oxides, mixing roasted product with carbonaceous material suitable for coking, forming mixture into briquettes, distilling briquettes that they are first coked into coherent masses, finally zinc reduced and volatilized while lead is reduced; lead and silver retained in minute particles throughout coke.

DERRICK AND DUMPING DEVICE.—No. 665,757; W. S. Rynearson, Boise, Idaho.



Combination with scoop, hoist rope, casing, and bail connected with forward portion of scoop and upper portion of casing, of bar held to slide in casing, upper end connected with hoist rope, keeper formed therein, spring controlled latch carried by casing, adapted to enter keeper in bar, lever connected with latch, spring controlled keeper bar having sliding movement in casing arranged for locking engagement with lever, flexible connection between lower end of keeper bar and rear end of scoop, means for limiting upward and downward movement of casing.

LEVEL INDICATOR FOR HOISTS.—No. 665,821; C. E. Anderson, Aspen, Colo.



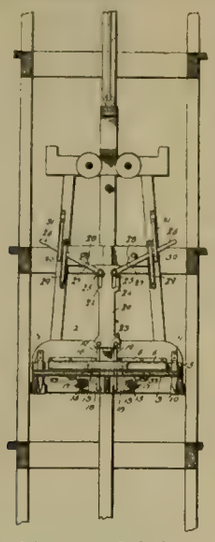
A level, station or landing indicator, for hoisting apparatus of mines and the like, comprising essentially pointer, revoluble disk marked to indicate levels, stations or landings in shaft, and having surface travel approximately showing position or travel of lifting vehicle in shaft, second disk similarly marked and having greater surface travel than first mentioned disk, dead spindle upon which disks are mounted to turn, and different gearing interposed between disks for turning them.

ROCK DRILL SHARPENER.—No. 665,185; R. M. Crockett and H. J. Bundy, Moscow, Idaho.

A rock drill sharpener comprising elongated stock provided at one end with annular die-face and with central socket or bore opening through face, centering stem fitted at one end in socket or bore of stock

and held rigid therewith, stem extending beyond die-face, removable and replaceable.

CAGE CHAIR FOR MINES.—No. 665,823; M. H. Beck and J. R. Caynor, Victor, Colo.



Combination with cage, of chairs mounted thereon, slide, lever connected with slide and having limited movement independently thereof, means for connecting slide with chairs, guide loop receiving outer portion of lever, catch arranged to be engaged by latter, and spring located adjacent to catch adapted to retain lever in engagement with same, projecting from catch to form guide for directing lever into engagement.

The Leaching of Copper Ores.

Written for the MINING AND SCIENTIFIC PRESS by DR. J. OHLY.

During the last three years the lixiviation of copper ores has grown into an industry of quite remarkable proportions in consequence of the steady demand for the metal and the high price maintained for it since that time. The impetus to the unfolding of this rather modern branch of metallurgy must be attributed largely to the conditions existing at the Butte copper mines, where the shafts of some abandoned diggings had been flooded by the influx of subterranean waters, which changed the chalcopyrite present, under the influence of the oxygen of the air, into sulphate of copper and iron, and thus prepared, without outlay or expense, solutions of metallic salts, which were soon recognized as a fertile source for the recovery of the copper values contained in them. Ideal conditions like these are, however, not encountered again in the territory of the United States, so that the first step in the production of copper by the leaching process must necessarily consist in the artificial preparations of the metallic solutions required for the subsequent separation of the copper. This reduction from solutions can be effected in several ways, the most usual being the addition of iron scraps, and the treatment of the liquids containing the metals by the electrolytic method.

A great number of acids and salts, when in aqueous solution, are known to exert a solving action of different gradation upon certain kinds of copper ore, and, consequently, a good many leaching processes have been patented in the past three years, among them a process of recent times, which resolves itself, on closer inspection, into the simple treatment of the crushed ore by means of sulphuric acid, salt and black oxide of manganese, and whose merits must appear rather doubtful to the average metallurgist on account of the expense incurred. Lately, also, the application of salt and nitre cake, or the employment of a mixture of both these compounds in aqueous solution, has been patented—a process which has been explained and described in the MINING AND SCIENTIFIC PRESS of Dec. 29, 1900.

In general, however, it may be said that the extraction of copper from its ores is best accomplished by the utilization of sulphuric acid alone, or of a mixture of the latter and nitric acid in dilute condition, which can be acquired in the form of so-called chamber acid from sulphuric acid works, and represents a very inexpensive and effective article for the purpose under consideration. Hydrochloric (muriatic) acid, which may be obtained at very low figures in the extreme East or West, where the manufacture of soda is yet carried on according to the Leblanc process, is also a good solvent for lixiviating purposes, though its use is naturally limited by local conditions. The writer has also found that a mixture of a solution of bichromate of potassium, salt and sulphuric acid constitutes a liquid which not only dissolves the copper from ores to a quite satisfactory percentage, but also removes the gold values from them, though the subsequent electrolytic treatment for the recovery of the copper values offers some difficulties, which, however, may be readily overcome by the employment of a low electromotive force.

A large copper extraction plant, lately erected in the vicinity of Denver, Colorado, employs exclusively the chamber acid mentioned above, and the writer knows by personal experience that this liquid has given great satisfaction in comparison to the many solvents tried before. The ore in the case under consideration consists in the aggregate of carbonates of copper, accompanied by small amounts of copper sulphide, and it is quite evident that the contact of the crushed ore with an active dissolving and oxidizing medium, like chamber acid, which contains besides sulphuric acid varying amounts of nitric acid and the lower oxides of nitrogen, must greatly contribute to the rapid solution of the copper values present. No preliminary roasting of the ore being required in this case, it will be readily seen that the erection of an extraction works of this kind requires but limited capital, and that the resulting profits must be large; considering the high price of the final product.

On the other hand, an ore consisting mainly of copper sulphide, like chalcopyrite, or a siliceous copper ore, and a real silicate of copper requires careful and thorough roasting before lixiviation can be resorted to. Copper ores of this character are, as a rule, contaminated or mixed with iron sulphides (pyrites), and would require great amounts of nitric acid to change the sulphur present, which reaches sometimes 35% of the ore, into sulphuric acid, hence the cheaper method of subjecting the ore to a roast, effected at about 50 cents a ton, is employed in this case without exception. This operation is best performed in a reverberatory furnace, and is the only manipulation required, since the desired sulphate of copper can be obtained by this method in a condition suitable for the extraction by water alone.

The roasting of chalcopyrite, which we will consider first, can be conducted in such manner as to produce copper sulphate and ferric oxide as the final results exclusively. These results are obtained by carrying on the roasting process at a gradually increasing temperature, and by maintaining an oxidizing atmosphere throughout the operation,—in other words, by admitting air from the beginning to the end of the process. The changes occurring under observation of these conditions consist primarily in the formation of iron sulphate from the pyrites present, and in the subsequent decomposition of the latter into ferric oxide, which reaction is accompanied by the liberation of sulphur dioxide SO_2 and sulphur trioxide SO_3. Simultaneously with these changes, the copper sulphide undergoes a gradual transformation into copper sulphate, which salt decomposes, however, at a higher temperature than the iron sulphate formed, and is brought back to the state of sulphate by the anhydrous sulphuric acid fumes produced from the pyrites, in case the heat of the furnace was too high, and sufficient to cause a part of the copper sulphate to be changed into copper oxide. On conducting and regulating the roasting process with the necessary care, the final product of oxidation will, therefore, consist of copper sulphate exclusively, which can be subjected to lixiviation with water, and the resulting solution either treated with iron scraps or by the electrolytic method to obtain the metallic copper. Hence, no acid is required in this case, providing the roasting process is well understood and executed with the necessary care.

In the second case under consideration—that is, on treating siliceous copper ore or real copper silicates for their copper contents by the leaching process—a preliminary roasting cannot be circumvented, either. We wish to add, however, as a reply to many inquiries made to us from time to time, that roasting alone will not answer for a successful treatment in this case—a point which is of the greatest importance, since enormous deposits of copper silicates are known to exist and lie idle, in default of a proper process, in California, Nevada and Idaho. To break up these intimately combined compounds, an admixture of common salt to the "moistened" ore, previously pulverized to 40 mesh, will be found to facilitate the decomposition of these bodies greatly, and to assure successful lixiviation subsequently. The reaction ensuing on subjecting this class of ores to roasting may be represented by the simple formula:

$$2NaCl + Cu_2SiO_4 = Na_2SiO_4 + 2CuCl,$$

meaning that the silica of these copper ores is enabled, by applying the necessary heat, to combine with the sodium of the salt and thus to induce the liberated chlorine to unite with the copper present to form cuprous chloride. The reaction is, however, much more complicated than might appear from the formula, since the moisture, added purposely to the subdivided ore, contributes to the formation of hydrochloric acid and chlorine—two factors which are most essential for the formation of the cupric and cuprous chlorides actually resulting. Since the first of these compounds is soluble in water, and the second in brine, there arises no special difficulty in the extraction of these salts from the cooled crusty material drawn from the furnace, so that the copper values, now present in the resulting liquid, may be recovered by the addition of iron or lime, by the electrolytic method, or by means of a copper cylinder filled with iron scraps and made to rotate by appropriate machinery. Since the acquisition of common salt is not combined with difficulties in any part of the States, this material will probably be preferred in most cases for the purpose intended. We wish to call attention to the fact, however, that it may be replaced by salt cake or sodium sulphate, which can be procured in some localities at a very low figure. The reaction occurring on subjecting a properly subdivided and moistened copper silicate to roasting with this material may also be represented by a simple formula, thus:

$$2Na_2SO_4 + Cu_2SiO_4 = Na_4SiO_4 + 2CuSO_4,$$

showing that the silica combines under these conditions with the sodium to form sodium silicate (water glass), while the copper combines with the sulphuric acid to form copper sulphate. But in this, as well as in the former, case the reaction occurring is really of a more complicated nature, owing to the presence of moisture and the formation of sulphurous fumes arising during the roasting. The final product consists, however, of copper sulphate, which may be leached out with water, and the solution obtained treated in a suitable manner. As to the amounts of salt to be added to the ore in the first case, and salt cake in the second, we wish to remark that an intimate incorporation of 15% of salt or 20% of salt cake to a 4% copper ore has been found by experiment to produce most beneficial effects, it being understood throughout this article that the application of the process indicated is limited to the treatment of low-grade copper ores exclusively.

In case the deposit to be worked consists mainly of sulphides of copper and is found by approximate examination to guarantee a mining of the ore for a number of years, the erection of a chamber acid works in combination with the lixiviating plant should find appropriate consideration—especially when the deposit is situated at a great distance from railroad communications, and the transportation of the acid is consequently combined with unusual difficulty and expense. A works of this character, which would allow of the employment of the solvent at the least possible figure, and should be limited to the production of chamber acid alone from the sulphides to be leached subsequently, would throw off an unusually large profit, considering that the present price of copper is maintained at 17 cents per pound, that the demand surpasses the supply by far, and that the output of the several American mines has not been sufficient to change this condition in the least during the last two years. It is also evident that in consequence of the expansion policy of the Government and the great number of electric enterprises now undertaken in Europe, this figure will be maintained for many years to come, and that no slump in copper prices is to be expected in the near future. These facts will become more clear when considering that the United States supplied already, in 1898, 55% of the metal used in the world, and that the great copper districts of the country produced the following amounts in that year:

	Pounds.
Arizona	110,823,864
California	21,543,229
Colorado	10,870,869
Michigan	156,669,098
Montana	216,979,337
Utah	5,385,246
Eastern and Southern States	4,478,218
All others	2,134,999
Copper sulphate (by-product)	7,015,375
Total	535,900,232

This production has been raised during the year 1899 to the following figures:

	Pounds.
Arizona	125,377,758
California	23,915,486
Colorado	10,614,252
Michigan	155,845,786
Montana	237,953,951
Utah	9,310,344
Eastern and Southern States	3,804,617
All others	4,989,000
Copper sulphate (by-product)	9,507,897
Total	581,319,091

And it may be predicted with certainty that the year 1900 will outstrip the annual production of 1898 and 1899 to a considerable extent.

(TO BE CONTINUED.)

Metallic and Non-Metallic Production.

The following is the total production of some metals and non-metals for 1899 and 1900:

	1900.	1899.
Coal, anthracite, tons	54,255,000	60,622,000
Coal, bituminous, tons	220,592,000	191,456,000
Iron ore, tons	26,417,000	25,341,000
Petroleum, barrels	63,100,000	57,234,000
Phosphate rock, tons	1,600,000	1,823,000
Aluminum, pounds	7,150,000	6,500,000
Copper, pounds	615,577,000	581,319,000
Gold, ounces	3,805,000	3,391,000
Iron, pig, tons	13,914,000	13,620,000
Lead, tons	252,000	217,000
Quicksilver, flasks	32,000	29,000
Silver, ounces	60,478,000	57,127,000
Zinc, tons	129,700	100,400

Annual Estimate of Metal Production, Coinage, Etc.

Wells, Fargo & Co. send their annual report of precious metals produced in the States and Territories west of the Missouri river (including British Columbia and Yukon Territory) during 1900, which shows in the aggregate: Gold, $99,100,733; silver, $42,402,502; copper, $69,752,284; lead, $18,059,908; total gross result, $229,315,427. The commercial value at which the several metals named herein have been estimated is: Silver, 61 cents per ounce; copper, 16 cents per pound; lead, $4.37 per hundred weight.

States and Territories.	Gold Dust and Bullion.	Silver Bullion.	Ores and Base Bullion by Freight.	Total.
California	$14,421,635	$202,948	$3,766,171	$18,390,754
Nevada	2,807,513	514,510	381,914	3,703,937
Oregon	2,299,614	131,420	5,000	2,436,034
Washington	316,949	165,353	173,848	676,150
Alaska	6,949,244	.....	136,066	7,085,310
Idaho	2,150,000	3,672,013	5,824,787	11,646,800
Montana	5,064,150	10,370,000	42,474,000	57,908,150
Utah	4,263,414	183,538	13,172,426	17,619,378
Colorado	27,175,000	14,960,500	5,780,730	47,916,230
New Mexico	960,494	112,004	2,277,047	3,349,545
Arizona	2,755,160	631,840	17,819,029	21,206,029
South Dakota	6,150,000	140,000	75,000	6,365,000
Texas	3,000	195,300	.....	198,300
Wyoming	75,000	11,000	85 000	516,000
Br. Columbia and Yukon Ter'y	23,344,560	3,750,000	3,203,250	30,297,810
Totals	$99,100,733	$35,040,426	$95,174,268	$229,315,427

The gross yield for 1900, as shown above, segregated, is approximately as follows:

Gold	43.21%	$ 99,100,733
Silver	18.49%	42,402,502
Copper	30.42%	69,752,284
Lead	7.88%	18,059,908
Total		$229,315,427

ANNUAL PRODUCTS OF LEAD, COPPER, SILVER AND GOLD IN THE STATES AND TERRITORIES WEST OF THE MISSOURI RIVER, INCLUDING BRITISH COLUMBIA AND YUKON TERRITORY, 1870-1900.

Year.	Product as per W. F. & Co. statements, including amounts from British Columbia and Yukon Territory.	Product after deducting amounts from British Columbia and Yukon Territory.	The Net Products of the States and Territories West of the Missouri River, Exclusive of British Columbia and Yukon Territory, Divided, are as follows:			
			Lead.	Copper.	Silver.	Gold.
1870	$ 54,000,000	$ 52,150,000	$ 1,080,000	.....	$17,320,000	$33,750,000
1871	58,284,000	55,784,000	2,100,000	.....	19,286,000	34,398,000
1872	62,236,959	60,351,824	2,250,000	.....	19,924,429	38,177,395
1873	72,258,693	70,139,860	3,450,000	.....	27,483 302	39,206,558
1874	74,401,045	71,965,610	3,800,000	.....	29,699,122	38,466,488
1875	80,889,057	76,703,433	5,100,000	.....	31,635,239	39,968,194
1876	90,875,173	87,219,859	5,040,000	.....	39,292,924	42,886,935
1877	98,421,754	95,811,582	5,085 250	.....	45,846,109	44,880,223
1878	81,154,622	78,275,167	3,452,000	.....	37,248,137	37,576,030
1879	75,349,501	72,688,888	4,185,769	.....	37,032,857	31,470,262
1880	80,167,936	77,232,513	5,742,390	$ 896,000	38,033,055	32,559,067
1881	84,504,417	81,198,474	6,361,902	1,195,000	42,987,613	30,653,959
1882	92,411,835	89,207,549	8,008,155	4,055,037	48,133,039	29,011,318
1883	90,313,612	84,639,212	8,163,553	5,683,921	42,975,101	27,816,640
1884	84,975,954	81,633,835	6,834,091	6,086,252	43,529,925	25,183,567
1885	90,181,260	87,311,382	8,562,991	7,838,036	44,516,599	26,393,756
1886	103,011,761	100,160 222	9,185,192	9,276,755	52,136,851	29,561,424
1887	104,645,959	103,327,770	9,631,073	10,362,746	50,833,884	32,500,067
1888	114,341,592	112,665,569	11,263,630	18,261,490	53,152,747	29,987,702
1889	127,677,836	126,723,384	14,593,323	14,793,763	64,808,637	32,527,661
1890	127,166,410	126,304,855	11,509,571	20,569,092	62,930,831	31,795,361
1891	118,237,441	117,946,565	12,385,780	13,261,663	60,614,004	31,685,118
1892	111,531,700	111,259,508	11,433,947	19,370,516	50,607,601	29,847,444
1893	104,081,591	103,827,633	7,756,040	23,631,339	38,491,521	33,948,723
1894	105,113,489	104,844,112	8,223,513	22,276,294	38,721,014	45,623,291
1895	118,164,642	117,896,988	7,170,367	27,052,115	35,274,777	48,399,729
1896	126,289,536	121,949,536	6,536,026	28,713,305	33,684,963	53,015,242
1897	153,435,469	142,853,469	8,775,144	36,388,694	34,034,034	63,655,597
1898	177,022,666	159,359,466	11,894,251	45,897,648	35,081,365	66,486,202
1899	203,541,907	179,678,966	13,667,248	58,849,994	34,594,498	72,567,226
1900	229,315,427	199,017,617	16,552,408	68,056,534	38,652 502	75,756,173

The exports of silver during the past year to Japan, China, the Straits, etc., have been as follows: From London, $53,091,033; from San Francisco, $9,434,690; total, $62,525,723, as against $39,886,795 last year.

MEXICO.

STATEMENT OF THE PRODUCT OF GOLD AND SILVER IN THE REPUBLIC OF MEXICO, REVISED AND CORRECTED FROM 1877 TO 1900.—VALUES UPON MINTAGE BASIS.

Years.	Gold.	Silver.	Total.
1877-1878	$747,000	$24,837,000	$25 584,000
1878-1879	881,000	25,125,000	26,006,000
1879-1880	942,000	26,800,000	27 742,000
1880-1881	1,013,000	29,234,000	30,247 000
1881-1882	937,000	29,329,000	30,266,000
1882-1883	956,000	29,569,000	30,525,000
1883-1884	1,055,000	31,695,000	32,750,000
1884-1885	914,000	33,226,000	34,140,000
1885-1886	1,026,000	34,112,000	35,138,000
1886-1887	1,047,000	34,600,000	35,647,000
1887-1888	1,031,000	34,912,000	35,943 000
1888-1889	1,040,000	40,706,000	41,746,000
1889-1890	1,100,000	41,500,000	42,600,000
1890-1891	1,150,000	43,000,000	44,150,000
1891-1892	1,275,000	45,750,000	47,025,000
1892-1893	1,400,000	48,500,000	49,900,000
1893-1894	1,425,000	47,250,000	48,675,000
1894-1895	1,750,000	54,225,000	58,975,000
1895-1896	5,475,000	54,450,000	59,925,000
1896-1897	8,500,000	60,683 000	69,183,000
1897-1898	9,925,000	67,525,000	77,450,000
1898-1899	10,112,000	65,810,000	75,422,000
1899-1900	9,750,000	67,800,000	77,550,000
Totals	$66,451,000	$970,138,000	$1,036,589,000

EXHIBIT OF THE COINAGE OF MEXICO FROM THE ESTABLISHMENT OF THE MINTS IN 1537 TO THE END OF THE FISCAL YEAR OF 1900.

Colonial Epoch.	Gold.	Silver.	Copper.	Total.
Unmilled coin from 1537 to 1731	$ 8,497,950	$752,067,456	$260,000	$760,765,406
Pillar coin, 1732 to 1771	19,889,014	441,629,211	.....	461,518,225
Bust coin, 1772 to 1821	40,391,447	888,563,989	342,893	929,298,328
Independence.	$68,778,411	$2,082,260,656	$542,893	$2,151,581,960
Iturbide's imperial bust, from 1822 to 1823	$ 557,392	$ 18,575,569	.....	$ 19,132,961
Republic eagle, 1824 to June 30, 1873	45,040,628	740,246,485	$5,235,177	790,522,290
Republic.	$45,598,020	$758,822,054	$5,235,177	$809,655,251
Eagle coin, from July 1, 1873, to June 30, 1900	$13,787,741	$636,591,503	$203,296	$650,582,540

SUMMARY.—Colonial Epoch, from 1537 to 1821, $2,151,581,960; Independence, from 1822 to 1873, $809,655,251; Republic, from 1873 to 1900, $650,582,540; total, $3,611,819,751.

EXHIBIT OF COINAGE OF GOLD, SILVER AND COPPER IN THE REPUBLIC OF MEXICO, FROM THE 1ST OF JULY, 1873, TO THE 30TH OF JUNE, 1900.

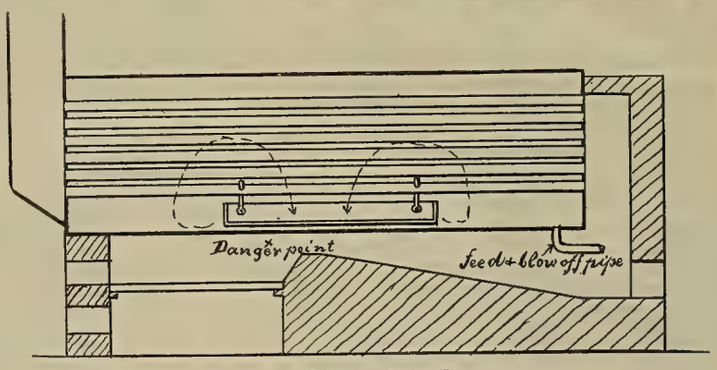
Years.	Gold.	Silver.	Copper.
1873-1874	$866,743	$18,846,067	$15,966
1874-1875	862,619	19,386,958	21,712
1875-1876	809,401	19,454,054	30,654
1876-1877	695,750	21,415,128	9,035
1877-1878	691,998	22,084,203	41,364
1878-1879	658,206	22,162,987	16,300
1879-1880	571,826	24,018,528	14,035
1880-1881	492,088	24,617,395	42,258
1881-1882	452,590	25 146,260	11,972
1882-1883	407,600	24,083,921	.....
1883-1884	328,698	25,377,379	.....
1884-1885	423,250	25,840,728	.....
1885-1886	425,000	25,850,000	.....
1886-1887	410,000	25,600,000	.....
1887-1888	340,320	26,711,000	.....
1888-1889	305,100	25,274,500	.....
1889-1890	243,298	24,328,326	.....
1890-1891	308,000	24,238,000	.....
1891-1892	291,940	25,537,000	.....
1992-1893	361,672	27,169,876	.....
1893-1894	553,978	30,185,611	.....
1894-1895	515,237	27,628,981	.....
1895-1896	565,786	22,634,788	.....
1896-1897	453,474	19,396,009	.....
1897-1898	459,219	21,427,057	.....
1898-1899	715,882	20,184,117	.....
1899-1900	598,086	18,102,631	.....
Totals	$13,787,741	$636,591,503	$203,296

SUMMARY.—Totals: Gold, $13,787,741; silver, $636,591,503; copper, $203,296; grand total, $650,582,540.

Device for Collecting Boiler Scales.

In the accompanying sketch I have depicted the interior of a horizontal boiler, showing flues, bottom, draft space and firebox, with an iron pan 4 feet long, 14 inches wide and 4 inches deep suspended by hooks from the flues and utilized as a scale collector. It was designed by C. C. Lewis, master mechanic at the Mary McKinney mine, at Anaconda, Cripple Creek district, Colorado. As set forth by Mr. Lewis, and as is generally recognized by boiler men, there is a central point at the bottom of the draft space where the scale material is conveyed by the currents which form the circulation of the boiler, depositing there a heap of scales, resulting in "bagging" the boiler. The placing of the pan in the position indicated so changes the currents as to sweep the scales from the bottom at the "danger point" and deposit them by counter currents in the pan. One pan has been placed in each of the four boilers at the Mary McKinney mine, and a trial of five or six weeks has convinced Mr. Lewis and Supt. Keener of the success of the device, and they have applied for patent therefor. When the boilers are periodically cleaned, the bottom, where the "bagging" usually occurs, is found clean and the pans are found heaping full of the compact scale material. ENGINEER.

Anaconda, Colo., Dec. 15, 1900.



Device for Collecting Boiler Scales.

Improvements at Arkansas Valley Smelting Plant, Leadville, Colo.

Through the courtesy of Manager Weddle, Supt. James and Asst. Supt. Johnson, the writer was enabled to make note of the improvements that recently have been made at the Arkansas Valley, or Leadville, plant of the American Smelting & Refining Co. Of the ten furnaces, seven have been enlarged and raised to a higher plane; four of these have each a capacity of 120 tons per day, the other three being good for 160 tons each per day. Three others, which are of the old type, have each a capacity of eighty tons per day. The latter are to be torn down and replaced with larger ones. At present the furnace capacity equals 1200 tons per day. The greatest piece of work has been the construction of over 3600 feet of horizontal flue line, making over 5000 feet in all, and the erection at the focal point of the various flue branches of a new smokestack, 18 feet diameter and 185 feet high. The flue structure is supported by heavy I-beams, holding together a metal frame; between the frame pieces are metal screen work, upon both sides of which is a heavy layer of cement. The dust chamber, at the lower part of the flue, is V-shaped, with an arrangement for gathering the dust and dumping it into cars, which pass along a trackage below and to one side. This plan of structure holds good for over 1000 feet, with the idea of collecting the dust daily. Through the remainder of the distance a simpler structure is found, the dust from that part being collected less frequently. This flue dust is gathered and mixed with lime and made into bricks by a briquette machine, in which shape it forms a part of the furnace charge.

A system of trackage, of same width as the narrow gauge railway, is being laid from the discharge floor of the furnaces to the slag dump for the purpose of hauling away the slag in cars by a locomotive.

To desulphurize the sulphide ores before sending them to the furnaces a system of roasters is used, consisting of twelve reverberatories, one Ropp and one Horseshoe, all having a capacity of 230 tons per day. A flue of nearly the same character as that described above connects the roasters with the main smokestack.

The siliceous, oxidized, roasted and carbonate ores are separately bedded in places accessible to the charge floor, there being from 6000 to 10,000 tons in each bed. The charge, made up of dust bricks, roasted ores, carbonates, oxidized and siliceous ores, lime and coke, is methodically handled.

With the exception of a small tonnage of lead ores from the Cœur d'Alene region, the ores handled by this smelter are produced by Leadville and Aspen mines. They have at this plant facilities for carrying a supply of about 25,000 tons of ore in stock.

WASCOTT.

Leadville, Colo., Dec. 27.

MINING SUMMARY.

Specially compiled and reported for the MINING AND SCIENTIFIC PRESS.

ARIZONA.

COCHISE COUNTY.

A company is being organized in Youngstown, Ohio, to work the Grand Central and Contention mines, near Tombstone, which have lain idle for several years.——Good reports are received from properties near Dragoon.——On the El Provencia at Cananea, near Bisbee, a tunnel is in 76 feet. One of the 350-ton furnaces is now running and two more will soon be in operation.

Manager J. S. Douglas reports good progress at the Esperanza (gold), near Bisbee. —— The Moctezuma is shut down temporarily on account of a shortage of coke.——The Copper Crown Co., Dragoon, is shipping ore to the El Paso smelter.

GILA COUNTY.

The Pinal C. M. Co. will begin work on the Higdon & Haverly mines at Globe, recently bought by it. A hoist will go in on the Black Copper.——At the United Globe the miners are laid off owing to a shortage of coal caused by a strike of coal miners.

The furnace at the Old Dominion, at Globe, is daily treating 265 tons ore, and turning out 1,000,000 pounds of copper per month; it is said that $150,000 per annum is being saved in fluxing alone; about 300 men are employed.——At the Continental (copper) high-grade ore, carrying gold and silver, is being stored.

MARICOPA COUNTY.

The Arizona Copper Mountain Co. of Minnesota, capital $6,000,000, has begun operations in the Harqua Halas, near Phœnix. Diamond drills are in.

The Calmo Ore Co., capital $500,000, is incorporated at Phœnix.

The Algonquin M. Co. is incorporated at Phœnix.

MOHAVE COUNTY.

Blakely & Harris have leased the Ben Butler, in Aubrey district, near Kingman, and they are now taking out ore which will be crushed at the Tremain mill, on the Big Sandy.——Minneapolis men have started work on the Ellen Jane and Tomanotto claims, in Music mountains, near Hackberry. The shaft on the Tomanotto will be sunk an additional 200 feet.——The sampling works at Kingman were burned down on the 9th inst. They will be rebuilt immediately.——Huntington & Averel, who have a bond on the Maguire mines, near Kingman, will put in an electric plant at the mines and will operate the mill and pumping machinery by electricity. They also figure on supplying Kingman with electric power and light. ——The Elkhart Mining Corporation, Ltd., of London, England, will begin work on the Elkhart mines at Chloride soon. ——Work on the Paymaster at Mohave is suspended owing to influx of water. A pump will be put in, the mine will be unwatered and work will resume.——J. Jackman is running a tunnel on the old Overland, in the Wallapai mountains. The ledge is cut at the 75-foot mark.—— The Tennessee concentrator is going in. ——J. H. Johnson is sinking a new shaft on the Stockton.——R. Gray is taking out good ore from the Miner's Hope, Stockton Hill.——Kemper Bros. are working the Arizona Belle, on Stockton Hill.

PINAL COUNTY.

The Hailey & Souffrien lead mines, near Globe, are reported sold to Colorado men. Supplies are going in and work is to begin.

YAVAPAI COUNTY.

During 1900 the United Verde M. Co. of Jerome paid dividends amounting to $2,325,000, or 77.5% on its capital stock.—— Two ledges of aikenite, a mineral much used in the arts, and worth $75 per pound, are reported opened up 7 miles south of Prescott.——The Brookshire at Jerome is closed down, owing to a break in the machinery.——Good ore is opened up at a depth of 30 feet on the Verde Con. group. The Sultana (copper), near Carbonera, in the Ures district, 40 miles east of Carbo, is sold to J. L. Giroux.

YUMA COUNTY.

The Arizona Giant Copper Co., operating the Trigo and Self Defense groups, near Ehrenberg, will probably put in a concentrating plant and a smelter this year.——J. W. Smith of Denver, Colo., has bonded the Sea Gull, Robert Lincoln, Lion and Tiger mines in Silver district, on the Colorado river, 40 miles above Yuma, for $20,000. Work is in progress on the Sea Gull and Robert Lincoln. Should developments prove satisfactory, Mr. Smith will probably put up a 500-ton concentrating plant, either at the mines or on the banks of the Colorado, 5 miles distant.

The Arizona Giant Copper Co., operating 10 miles northwest of Ehrenberg, will build a 100-ton per day concentrating plant on the Colorado river 6 miles from the mines; an electric power and light plant is also projected; twenty men are employed.

CALIFORNIA.

ALAMEDA COUNTY.

The mineral products of the county are salt, coal, manganese and structural material. The total value of the mineral output of the county for three years ending December, 1899, was $1,255,888. Of this sum the value of the salt output was $432,730 and of the coal output $468,729.

AMADOR COUNTY.

The mineral products of the county are gold and silver, coal, copper, marble and pottery. The total value of the mineral products of this county for the three years ending December, 1899, was $4,812,336. Of this sum the value of the gold output was $4,675,704. In the spring of 1900 there were about thirty-seven gold mines, one copper mine, fifteen mills, three slimes plants, one chlorination plant and one copper smelter in active operation.

Drifting is in progress on the 300, 600 and 1200-foot levels of the Lincoln, at Sutter Creek; Supt. Voorheis.——The shaft on the Peerless is down over 600 feet; the payroll amounts to about $2000 per month. ——The Con. Jackson M. Co. of San Francisco, organized to work the Pleming, will sink a three-compartment shaft to the 1000-foot level.

The Motto, near Jackson, cleaned up $1400 after one month's run recently.—— The Emery M. Co. is working the Live Oak (quartz); a shaft is being sunk and drifting and crosscutting will be begun on the 200-foot level.——The Golden Eagle M. Co. is working the Reichel (gravel). ——The Sheperd (gravel) is to be worked by the Emery M. Co.——The Ritter will be worked again this spring; a mill and other improvements will go in.——A tunnel will be run on the Martha, adjoining the Ritter.——At the Balliol mines, Sutter Creek, W. H. Storms Supt., the South Park Hill tunnel was in 230 feet on the 1st inst.; two crosscuts are being run—one at the face and one at the 190-foot mark; experimental tests as to relative cost of wood and coal for fuel show latter to be somewhat cheaper, wood now being held at $8 per cord at the mine.——At the Mutual a new drift east of the shaft is started; fifty tons of good ore were recently taken from the west crosscut on the 400-foot level.——More men were recently put on at the Argonaut, sinking is in progress.——A good chute of ore is reported struck at the Mitchell.

After a shut-down of over a year the Cooper and Boom mines at Oleta have resumed operations.——Supt. Purrington has everything running smoothly at the Grover and Fremont mines, Sutter Creek. ——At the South Eureka the 20-stamp mill is running steadily; J. F. Parks Supt.

BUTTE COUNTY.

The mineral products of the county are gold and silver, mineral paint, mineral water and structural material. The total value of the mineral output of this county for the three years ending December, 1899, was $1,714,030. Of this sum the value of the gold output was $1,668,379. In May, 1900, six quartz, six drift and two hydraulic mines were being worked. Later on extensive dredging enterprises were put in operation.

The Cherokee, at Cherokee, has resumed operations; two monitors are working and three additional ones will be put in operation soon; the dam, 3 miles west of Pentz, is 1800 feet long.

CALAVERAS COUNTY.

The mineral products of the county are gold and silver, mineral paint and copper. The total value of these products for the three years ending December, 1899, was $3,771,701. Of this sum the value of gold output was $3,724,448. In April, 1900, there were twenty-five quartz, three drift, two hydraulic and two copper mines in operation, also thirteen mills, one copper smelter, two chlorination works, one cyanide plant, two electric power and six compressor plants.

On the Lew Wallace group, 2 miles northeast of San Andreas, there are about 500 feet of tunnels.

At Sheep Ranch the electric line to the mill is about completed; as soon as machinery is in place operations will begin.

Another strike of rich ore is reported made at the Sunnyside, on Nelson creek, near Railroad Flat.——Work is progressing on the Little Giant (quartz), recently bonded to B. C. O'Neil of Jackson for $3000. A shipment of ore recently made to the Selby Smelting & Lead Works, San Francisco, returned $225 to the ton. ——Work on the Last Chance and Afterthought mines, recently bonded to W. W. Cook of Mokelumne Hill, will begin.—— W. V. Clark has started work on his gravel mine near Railroad Flat.——A new 4-foot Pelton wheel is going in at the Rose Hill mines, near Valley Springs.

COLUSA COUNTY.

In September, 1900, three quicksilver mines were in operation, and prospect wells were being drilled for oil.

The Gorrell well No. 2, at Arbuckle, is down 450 feet.

DEL NORTE COUNTY.

The mineral product of the county is gold, which, during the three years ending December, 1899, amounted to $30,217. Recently there has been some attention paid to the copper mines of this county, and shipments of ore are reported.

FRESNO COUNTY.

The Ajax Oil Co., on Section 32, 19–15, Coalinga, is down 500 feet.——The well of the Corona Oil Co., on Section 32, near Coalinga, is down over 600 feet.——The Roanoke Oil Co. will sink a well near Coalinga.

HUMBOLDT COUNTY.

The mineral products of the county are gold and silver, mineral water and structural material. The total value of these products for the three years ending December, 1899, was $883,113. Of this sum the value of the rubble rock, used principally in the harbor construction, was $651,623. Copper prospects have been discovered, but there are no productive mines. During 1900 six companies have prospected for petroleum, and some oil has been struck.

INYO COUNTY.

The mineral products of the county are gold, silver, lead, copper, soda, borax and marble. The total value of the mineral products of Inyo county for the three years ending December, 1899, was $1,247,696. Of this amount the value of the output of gold was $411,134, and of the output of soda $514,000. In July, 1900, there were thirty-two gold and silver mines and one borax, one salt and one soda works in operation.

KERN COUNTY.

The Superior No. 1, on Section 2, 11–24, Bakersfield, is spurting oil; although being pumped at the rate of 100 barrels per day, the oil can not be lowered an inch; drilling on No. 2 well will begin soon.—— It is reported that a company is being formed to operate on lands in 26–28, where it is thought the sand will be struck at a depth of 2000 feet; new company will be known as the Travelers of Arizona.—— The Queen Esther Oil Co. has started drilling on 31, 28–28; two additional rigs are going in.——The Con. Crude Oil Co. of San Francisco has leased twenty acres in the southwest quarter of 8, 29–28, on a royalty of one-fifth; purchase may be made at any time within six months at $2500 an acre; a bonus of $5000 was paid for the lease.——The Emerald Isle Oil Co. has put up a derrick on 18, 28–28, near Bakersfield. —— The Golden Gate Oil Co., on 34, 12–24, has struck fine sand at a depth of 700 feet.

The hole of the Edgar, on 18, 28–28, near Bakersfield, is down 1360 feet.—— The Western Minerals Oil Co., on 17, 11–23, has struck oil sand at a depth of 398 feet. —— The Gould, northwest of Temblor, is down 1100 feet.——A. F. Morrison has leased the northeast of the southwest of 7, 29–28; he pays a bonus of $1000, and agrees to drill to a depth of 2000 feet if oil is not sooner struck.—— The Spencer Oil Co. is putting in a derrick on the southeast quarter of the southwest quarter of 28, 30–22.——The J. B. B. well, on Section 35, 12–24, is producing 2000 barrels per month.——The addition of Jewett & Blodget's refinery, at Sunset, is completed; plant now has a capacity of 300 barrels oil per day.

LOS ANGELES COUNTY.

The Silver King Oil Co., capital $500,000, is incorporated at Los Angeles.

The Glen Oil Co., capital $1,000,000, is incorporated at Los Angeles.

NEVADA COUNTY.

A ledge of good ore is reported on the Kirkham, near Nevada City.——A good body of sulphurets is reported opened up on the 200-foot level of the Lecompton, in Willow valley, near Nevada City; the ledge is 20 inches wide, and ore is said to run about $500 to the ton.——At Nevada City, Dunlap & Thomas are moving the machinery from the Wyoming to the Lecompton.

C. M. Root of Moore's Flat, operating the Independence (quartz), at Wolf creek, has unwatered the shaft, which is 181 feet deep, and is crosscutting on that level.

The Yuba, at Maybert, is reported bonded to J. L. Bryson and others.

ORANGE COUNTY.

The output of the Fullerton oil fields for December, 1900, was 51,000 barrels.—— The Columbia Oil Co. is down 990 feet in its No. 9 well; No. 10 is down 950 feet.

PLACER COUNTY.

The Great Channel M. Co. of Chicago, which recently bought J. B. Sellier's gravel mine near Bath, is running a lower tunnel on the property, which will probably go to the 1300-foot mark.——A. Clark has put in a new pump at his tunnel at Yankee Jim's, and work is going ahead satisfactorily.——Handy & Ellison are working the Good Friday, at Ophir, with good results.

RIVERSIDE COUNTY.

It is said that an Eastern company stands ready to take over the iron mines in Eagle Mountain district when litigation between Cook and partners and Garrett and partners is settled; there are twenty-six claims located in the district, aggregating 538 acres.

SAN BENITO COUNTY.

The San Benito County Oil Co. at San Benito is down 560 feet.——At Hollister the Hollister Crude Oil Co. is putting in a rig on the Chappell ranch.

SAN DIEGO COUNTY.

Oil is reported at a depth of 600 feet at the Victoria, near Encinitas.——The well of the San Diego County Oil Co, near San Diego, is down 671 feet.——The Medina Oil Co., capital $500,000, is incorporated at San Diego.——The well being bored on the Encinitas grant, near Encinitas, is down 700 feet; a rotary drill is used.

SHASTA COUNTY.

The Fremont Oil Co., capital $300,000, is incorporated at Redding.——The Shasta Con. Oil Co. is putting up its drilling plant on Section 2, Township 32 North, Range 3 West, on Little Cow creek, near Redding.

The Midas, in Harrison gulch, near Redding, is closed down temporarily, owing to a scarcity of wood.

SIERRA COUNTY.

The Telegraph, on Fur Cap, near Downieville, is sold to J. W. Finney, representing Eastern men; the tunnel will be cleaned out, retimbered and driven an additional 150 feet.

SISKIYOU COUNTY.

At the Gold Ball, in Eddy Gulch district, near Yreka, fifty men are employed. The 20-stamp water-power mill is running steadily.——A recent mill run on 600 tons of ore from the Ohio gave $10 per ton by amalgamation.——Work at the Portuguese is progressing steadily.——A vein of $20 ore is reported opened up at the McBride; J. McBride, owner.——In Hungry Creek district twenty men are employed at the Gold Run; the output is given as twenty tons of high-grade ore daily.—— Ore from the Hammar, same district, is said to run $16 to the ton.——Work at the Cleaner, in Liberty district, goes ahead steadily.——At the Lanky Bob two tandem arrastras are crushing eight tons of ore daily; ore is said to run $45 to the ton.——At the Hoodoo $80 ore is being taken out.

A good clean-up is reported made at the former Oak & Co. claims, in Happy Camp; Manager Van Brunt.

TUOLUMNE COUNTY.

A 20-stamp mill is ordered for the Mack, at Groveland.——Drifting is in progress on the 400-foot level of the Rhode Island.—— At Big Oak Flat the Mississippi is being dismantled; some of the machinery is on the Rhode Island.——A new mill and hoisting plant are to go in on the Mack. ——At the Longfellow, drifting is in progress on the 500-foot level; the extra ten stamps will go in soon.——A good body of ore is reported opened up on the tenth level of the Dutch.——An engine and pump will probably go in at the Fleming.

Drifting both ways is in progress on the 800-foot level of the Grizzly at Carters, and drifting north is under way on the 700-foot level.——The new 10-stamp mill on the Hope is ready for work.

VENTURA COUNTY.

The Ojai Oil Co. has struck a good body of oil sand at a depth of 850 feet.——No. 1 of the Aguilla Oil Co. is down 110 feet.—— The Gravity Oil Co., in Timber canyon, is down 780 feet in its No. 1 well.

COLORADO.

BOULDER COUNTY.

An incline is being run below the 600-foot level of the Yellow Pine, at Wall Street, recently leased to Older & McClure; ore is said to carry galena, gray copper, ruby silver and native silver running nearly $1000 to the ton.——In the west drift in the Franklin, of the Wood Mountain M. Co., a 5-foot body of ore running $14 to the ton is reported opened up.——Andregg & McRae have leased the Franklin shaft, and have put a winze on it.——The Gold Nugget Co., operating the Dime group, has ten men working and is shipping a carload of ore per week; a gasoline hoist and other machinery will probably go in soon; shaft is 65 feet deep, and tunnel is 600 feet long; new shaft and ore house are in.——The 60-stamp mill at the Slide, Boulder, is treating 200 tons of crude ore daily; fifty men are employed. ——The Atlas Reduction Works, at Boulder, contemplates a bromination system for reducing ores, as now in use in Europe, and has sent its manager, C. D. Grove,

over there to examine into its merits.——The Logan, Wall Street, is said to have produced about $100,000 during the year 1900.——The Nugget mill, at Ward, is running steadily.——At the Big Five a pipe line is being laid from the reservoir in the adit tunnel to the mill; when in, work will be resumed in mine and mill.——Sixty men are working at the Logan, Wall Street.——There are 1597 men employed in the mines of the county.——The shaft on the Lucky Star, at Boulder, is down 825 feet; levels are run both ways at 100, 150, 200, 250 and 300 feet; R. A. Duncan, manager.

Good ore is being taken out at the Belleview, near Ward.——The tunnel on the Ward Rose is making good progress.——The Lucky Star, near Gold Hill, is shipping steadily.——The Golden Fox M. Co. is sinking a shaft and running a tunnel on the Golden Fox.——The tunnel in the Baltimore Bell is being timbered.——The Earl M. & M. Co. has started work on the Eclipse.——The B. & M. is shipping smelting ore; it is also storing mill stuff, which will be run through the mill now being put in shape.

CHAFFEE COUNTY.

The Tesmania Co., at Winfield, is pushing work on its properties; as soon as it has enough ore on the dump it will start up the smelter.——It is reported that the Buena Vista Smelting & Refining Co. will add two more stacks to its smelter at Buena Vista; a refinery will be built.

CLEAR CREEK COUNTY.

Work on the Kelly tunnel will be continued through the winter; the tunnel is to be driven 7000 feet.——The Oro Verde tunnel, at Yankee, is expected to cut the vein at a depth of over 400 feet.——The tunnel in the Mayflower is in 200 feet.——A station is being cut on the 75-foot level of the Cumberland; shaft will be sunk to the 500-foot level.——The '94 tunnel is going in; machine drills are used; the new mill cost $30,000; capacity fifty tons per day; twenty men are employed.——The Sierra Nevada tunnel is in 400 feet.——The Stonewall has contracted with the '94 mill for daily treatment of twenty-five tons of ore.——Three shifts are running the crosscut on the Joe Reynolds, at Lawson.——Work on the Jack Rabbit is resumed.——A tramway is going in at the Red Oaks, near Georgetown.——The shaft on the Grand Trunk, Gilson Gulch, is down 125 feet.——The tunnel in the Tropic, now in 600 feet, will be continued to the 3000-foot mark.——A new hoist is in on the Santa Fe.

Operations on the Doric tunnel, at Georgetown, will be resumed.——The hoisting plant at the Smuggler is in operation, and ore is being taken out of the level below the tunnel; sinking will be continued.——Georgetown is organizing a Board of Mines and Commerce.

DOLORES COUNTY.

The Emma mill, at Rico, is closed for the winter; work in the mine is progressing; ore is being stored for working next spring; Mgr. R. Keller states that the company contemplates building a large mill next spring.

EL PASO COUNTY.

The new Portland mill, going in near Colorado Springs, will have a capacity of 400 tons daily.

FREMONT COUNTY.

Daily oil yield at Florence is over 3000 barrels.

Daily capacities of mills at Florence are given as follows: The El Paso Reduction Co., 125 tons; Metallic Extraction Co., 400 tons; National G. Extraction Co., 125 tons; Dorcas M., M. & Dev. Co., 125 tons; Union Gold Extraction Co., 300 tons, and the Cripple Creek-Beam mill, 100 tons. The Dorcas mill, in construction, was so built that its capacity can be doubled when the company decides to enlarge the plant. Its capacity then will be 250 tons daily. The Page mill has a capacity of 100 tons also, but has been in litigation since its erection.

Nearly 1500 men are employed in the coal mines near Florence.

GILPIN COUNTY.

The shaft on the Justice, in Lake Russell district, near Central City, is down 700 feet; two shifts, thirty men each, are working.

GUNNISON COUNTY.

At White Pine the Lilly shaft is drained and will be retimbered.——Work in the Eckern tunnel is progressing.——The tunnel on the Lilly Dell, in Gold Brick district, is in 270 feet; the property is owned and operated by A. H. Conroy.

HINSDALE COUNTY.

J. H. Sloan is working the Travis group, on Gold hill, near Lake City.——New machinery is going in at the Peniston mill.——Hunt & Peavy are pushing development work on the Goshen.——The winze at the Black Crook will be sunk a distance of 100 feet.——At Carson, the Red Snapper, Miner's Fate, Yellow Jacket and Boxer claims are deeded to the Bachelor M. Co. by J. F. Thompson as trustee.——The Ute working tunnel is now in over 1400 feet.——The Fleece mill has resumed.

HUERFANO COUNTY.

The Western Oil M. & Ref. Co., capital $100,000, is working oil lands near Badito, in the Great Horn range, 10 miles north of Walsenburg; the company will build a refinery on the property should developments prove successful.——A new strike of coal is reported near Badito.——On the Mountain Monarch, at Ward, the Duplex M. Co. has a vein of galena ore 18 inches wide; assays run $200 to the ton; eleven men are working, and more will be put on in the spring, when new machinery goes in.

LAKE COUNTY.

During 1900 the Home M. Co., at Leadville, produced 96,000 tons of ore, valued at $700,000.——The output of the district for January is estimated at 2800 tons daily, valued at $30,000.——The Home M. Co. has secured an extension of ten years to its lease of the Penrose, at Leadville.

A Pittsburg company has control of the Rex, at Leadville, and ordered new machinery.——Regular shipments of ore are being made from the Fortune, on Little Ellen hill.——On the Garbutt, thirty men are employed; from fifteen to twenty tons of ore are being shipped daily.——The Moyer shaft is shut down temporarily owing to a break in the hoister; a new hoist will be put in.

OURAY COUNTY.

The Meldrum tunnel, being driven from Ironton to Telluride, is in 800 feet from the Ironton end; the tunnel will be 12x12 feet, and when completed it will be 23,315 feet long and will run beneath the crest of the range 3426 feet, cutting the Sheridan, Japan, Revenue, Columbia, Menona, Tom Boy and other veins.

PUEBLO COUNTY.

The Elizabeth G. & S. M. Co. is incorporated at Pueblo to work properties in Poughkeepsie gulch.

SAN JUAN COUNTY.

The Silver Ledge at Silverton is to be developed on a large scale by J. B. Warner and others of Youngstown, Ohio; a mill with a capacity of 150 tons ore per day will be put in.

The crosscut on the Parker at Silver City is in 85 feet.——The smelter at Silver City has started up again.——The Senator tunnel, being driven into North Lookout mountain to tap the Harriet A. lode, is in 300 feet; estimated distance to run 35 feet.——Ore from the Victor Hugo in Maggie gulch runs $60 to the ton.——The crosscut tunnel being driven on the Irene, now in 212 feet, will be run an additional 250 feet to tap the lead; Casad & Watson, owners; ores carry ruby silver and gray copper.——A new mill, with a daily capacity of 150 tons, is to go in on the Silver Ledge at Chattanooga next summer; J. B. Warner Supt.——On the Anglo-Saxon of the Gold King Con. M. Co. an upraise is being run from the tunnel to the surface.——The new engine for the Kendrick-Gelder smelter at Silver City is of 100 H. P.; tubular boiler is 16′x54″.

Near Silverton, a new air compressor will go in on the Tom Moore.——A mill will probably go in on the Occidental this spring.——The Red Mountain M. Co., A. A. Brown, Mgr., will begin operations on the Lead Carbonate group, on Las mountain, near Gladstone.

SAN MIGUEL COUNTY.

Output of the mines of the county for 1900 was as follows:

Gold	$1,763,900
Silver	571,100
Lead	150,000
Copper	15,000
Total	$2,500,000

Dividends declared and paid by mines of this county for the year 1900 were as follows:

Smuggler-Union (gold-silver)	$400,000
Tomboy (gold)	150,000
Japan (gold-silver)	40,000
Liberty Bell (gold)	60,000
Carribeau (silver-lead)	20,000
Butterfly-Terrible (gold-silver)	30,000
Total	$700,000

The Telluride end of the Meldrum tunnel is in 2000 feet.

During 1900 there were shipped from Telluride 1893 cars of ore.——The Smuggler-Union at Telluride has about 500 men employed; a 3000-foot tunnel, the Pennsylvania, is run in the property; New England Exploration Co., owners; production for 1900 is given as $386,957.80.——Eighty 850-pound stamps are dropping at the Liberty Bell; plant is operated by water power during a part of the year, but principal motive power is furnished by two electric motors, current supplied by the Power Transmission Co.; mine and mill are connected by a tram 2 miles long; eighty men are employed; output for 1900 is estimated at $250,000.——During 1900 the Butterfly-Terrible produced nearly $80,000; from thirty to forty men are employed steadily; $400,000 worth of ore are estimated in sight.——The production of the Japan for 1900 is given as $117,500, most of this being gold; a tunnel will be driven on the property.

TELLER COUNTY.

The property of the Merrimac Con. M. Co., consisting of 12½ acres adjoining the Mary Nevin at Cripple Creek, has passed into the hands of the Ross, Blake & Griffin Investment Co.; work will begin immediately.——The Zoe is shipping ore taken from the 300-foot level.——A deal is reported for the sale of the White Elephant, Happy Day and Fraction No. 1 claims on Gold hill, and fifty-three acres on Galena hill; if deal goes through a company will be organized to work the properties.——The Grace G. M. Co. will probably begin work on the Extra on Squaw mountain.

The machinery for the St. Thomas on Beacon hill, Cripple Creek, is on the ground.——The old 6x8 hoist formerly used on the Clyde is now on the Sedan on Galena hill.——The new machinery recently ordered for the Gold Bond on Gold hill is going in.——A new 125 H. P. boiler is in at the Independence Consolidated.——The new hoist for the Golden Cycle is going in.——The Cripple Creek Home M. Co. is crosscutting both ways from the shaft at the Home.——The Bush-Moffat tunnel, now being operated by the Gold Exploration Tunnel Co., is completed for a distance of 3000 feet.

A strike is reported in the tunnel of the Little Puck on Squaw mountain, Victor, at a point 700 feet in.——The Victor Leasing Co., operating on the north block of the Theresa, has opened up ore on the 150-foot level.

T. D. Faris is operating the Little Diamond on Battle mountain, Victor.——The shaft on the Eclipse is down over 400 feet.——Three new boilers, of 250 H. P. each, are to go in at the Elkton; foundations for and 46x68-foot building to cover same are going in; two stacks to go up over the boilers will be 100 feet high and 5 feet in diameter; two 25-drill air compressors will go in.——At the Ajax extensive additions are being made to the plant; an engine and dynamo are going in and a 25-drill air compressor will be put in.——A 100 H. P. boiler is going in at the Rubie of the Princess Alice Co.——The new hoist for the Legal Tender of the Golden Cycle Co. is expected to be running by Feb. 15th.——A new 250 H. P. boiler and a 15-drill air compressor are to go in on the Last Dollar.——A 25-drill air compressor will go in on the Vindicator.——At Cripple Creek the consolidation of the Beacon Hill-Ajax, the Morning Star and Mutual companies is made uniting twenty-five acres of ground in one group on Beacon Hill. The new company will sink a shaft on the Beacon Hill-Ajax to the 300-foot level, and will work the entire group through that shaft.——Sinking operations on the Kimberly at Victor are temporarily suspended, owing to a heavy flow of water struck at a depth of 370 feet.——Ore running from $20 to $40 to the ton is reported opened up on the fourth level of the Whisper shaft on the Gold Sovereign.——The Rubie of the Princess Alice Co. recently made a shipment of forty tons of four-ounce ore which was taken from the winze on the 900-foot level.——The shaft on the Lucky Guss is down 1000 feet.——The Jolly Jane Co. reports good progress in sinking the new shaft on the Tecumseh on Battle mountain. About 2 feet per day is made.——Development of the new strike recently made on the 335-foot level of the Mabel M. shows ore shoot to be 6 feet wide, and it is said that screenings bring $360 to the ton.——At the Modoc work on the three-compartment shaft, which will go to the 1000-foot level, is suspended temporarily.

Phonolytic ore, running $18 to the ton, is reported on the 300-foot level of block No. 1 of the Dexter, at Victor; Supt. F. Strohm.——The Creston M. Co. of Creston, Iowa, is running a tunnel, now in over 400 feet, in the Sunset, on Squaw mountain; J. R. Young manager.

IDAHO.

ADA COUNTY.

The War Eagle tunnel, near Boise, is in 3050 feet. It will go an additional 3000 feet, more or less; Supt. F. Irwin.

BLAINE COUNTY.

A new 20-stamp mill will go in on the Hattie at Hailey.

OWYHEE COUNTY.

The Trade Dollar Con. M. Co., Supt. J. Hutchinson, is running a working tunnel from Dewey to the Tip Top group.

SHOSHONE COUNTY.

The Gertie M. Co., capital $100,000, is incorporated at Wallace to work a group of claims near Burke.——There are 2400 men employed in the Cœur d'Alenes, with a monthly payroll of about $250,000.

The new 100-drill water power air compressor plant at the Morning, Mullan, is running successfully. Power is furnished by the largest tangential wheel in the country—33 feet in diameter—with two 12-foot Pelton wheels, one on each side of the large wheel. The present capacity of the reservoir is 100,000 cubic feet of free air at about ninety pounds pressure, or about 10,000 stored horse power. The distance of transmission is 4 miles.

MICHIGAN.

HOUGHTON COUNTY.

The output of the Wolverine, at Lake Linden, for the month of December, 1900, was 249 tons 800 pounds of mineral product; for last six months of 1900 it was 1422 tons 200 pounds, or about 2,485,000 pounds of refined copper, valued at $180,000; new mill will go in soon.——The product of the Quincy for December, 1900, was 826 tons 1730 pounds of mineral.——The output of the Atlantic for December, 1900, was 267 tons 815 pounds of mineral; product for 1900 was 3288 tons 1995 pounds of mineral, or about 5,000,000 pounds of refined copper.——The Baltic during December, 1900, produced nearly 175 tons of copper.

MONTANA.

BEAVERHEAD COUNTY.

Ore assaying $176 to the ton is reported in the Mascot, near Polaris.

MADISON COUNTY.

At Washington Bar the Tacoma M. Co. is driving its tunnel, now in 75 feet, to the 1000-foot mark, at which point it will begin crosscutting.——The Red Bluff, Red Chief and Water Lode mines, near Pony, are shipping ore regularly.——At Sand Creek a station is being cut on the 300-foot level of the Chile.

SILVER BOW COUNTY.

Ore running $1200 to the ton is reported on 40-foot level of the Wasatka.

NEVADA.

ELKO COUNTY.

Ore running $8000 to the ton is reported opened up on the Dexter-Tuscarora at Tuscarora.

Near Tecoma work on the Lewissohn property is going ahead satisfactorily. Ore from this mine will probably be treated at the old copper plant north of Tecoma.

The Dexter-Tuscarora at Tuscarora recently shipped gold bars and gold dust to the refinery at Argentine, Kansas.

ESMERALDA COUNTY.

It is reported that thirty-five miners are working at Tonapah, the new mining camp.

LINCOLN COUNTY.

Supt. F. P. Swindler has everything running smoothly at the De Lamar at De Lamar.——The shaft on the April Fool is down 310 feet (ninth level). Drifting both ways is in progress at this depth. A 22 H. P. gasoline engine is in No. 6 tunnel at the 2000-foot mark. The property is equipped with a 10-stamp mill, with a cyanide department. A 3-inch pipe line, 9½ miles long, brings water to the mine and mill.

LYON COUNTY.

J. Deitrich, operating a mine on East Walker river, near Dayton, projects a mill on the property.

STOREY COUNTY.

The 100 H. P. motor to run the air compressor at the Con. Cal. & Va. shaft, Virginia, is in. The feed cable for electric light and power is being put in the shaft.

WASHOE COUNTY.

The Jumper, Olinghouse, is shipping ore to the Proctor mill. The latter will start up as soon as the weather moderates.——The machinery for the Hutchinson mill is on the ground and construction work will begin soon. The main tunnel on No. 1 is going ahead satisfactorily.——High-grade ore is being taken out of the Crown Point.

The Wedekind at Reno is making steady shipments of ore, which is said to run $2 to the pound.

WHITE PINE COUNTY.

The tunnel on the Sappho at Ely is being driven at a good rate of progress. Recent assays show ore to run $40 gold, with a small amount of silver, to the ton. It is likely that a mill will be put in on the property during the year.

NEW MEXICO.

BERNALILLO COUNTY.

The Cochiti, near Bland, is employing 150 men; the mill is running steadily; new territory is being opened up.——At the Navaho the new tunnel is going ahead satisfactorily; forty men are employed.

LINCOLN COUNTY.

The American Placer Co., operating placers in the Jicarilla mountains, north of

Capitan, has completed a new dredger, which weighs 210 tons and will handle ninety yards of dirt per hour.

SANTA FE COUNTY.

The first furnace of the new smelter of the Santa Fe M. Co. at San Pedro is turning out matte; Supt. Nelson.

SIERRA COUNTY.

The Hillsboro G. M. & M. Co., owning a group of claims at Hillsboro, will put in rolls and a cyanide plant.

The Ashville (gold), 3 miles south of Grafton, will be worked soon.

TAOS COUNTY.

A new plant is going in at the Black Copper at Red River.——The tunnel of the Deep M. & M. Co. is going in steadily in Baldy mountain.——More men are at work at the Copper King, and ore is being sacked for shipment.——Near the Ragged Pants group, east of Red River, a shaft is being sunk on a body of tellurium recently opened up.——A strike is reported made in the Coondyke, near San Cristoval. Machinery will go in and systematic development be begun.

OREGON.

BAKER COUNTY.

The tunnel on the Independence, in Wind Creek district, near Sumpter, is in 85 feet. A crosscut shows the ledge to be 20 feet in width.——The boiler at the Badger is in place. Deep sinking will be started. The shaft is down 100 feet. Ore is being saved for shipment to San Francisco. —— The Astoria & Melbourne M. Co., operating the Melbourne, near Sumpter, has crosscut the ledge at a point 100 feet in in the tunnel. The latter will be driven an additional 150 feet.——A 42-foot shaft is sunk on the Boer, in Bald Mountain district.——A 10-foot ledge is reported at a depth of 145 feet on the General Lawton, near Sumpter.——Work on the Keystone of the Fidelity M. Co. will be continued through the winter.

GRANT COUNTY.

A ledge of $12 ore is reported opened up on the Oregon Boy, in Alamo district. ——The tunnel on the Wonder, near Susanville, is in 60 feet.

JACKSON COUNTY.

The Old Channel Co. will operate three giants near Jacksonville.

MULTNOMAH COUNTY.

A smelter is projected at Portland. One hundred tons of ore daily have been guaranteed by mines operating along the line of the Oregon Railway & Navigation Co.

UNION COUNTY.

The Cornucopia mines of Oregon Co. has laid off fifty men at the Red Jacket, near Cornucopia.

SOUTH DAKOTA.

CUSTER COUNTY.

The Chicago Mica Co. is working the old Crown (mica), near Custer; twelve men are employed.——The Saginaw M. Co. of Saginaw, Mich., has begun work on a group of five claims 8 miles northwest of Custer; a 200-foot shaft will be sunk.——The New York (mica), 8 miles southwest of Custer, is said to be the largest mica producer in the United States; all ore mined is shipped to the Sills-Eddy Mica Co. of New York, they having agreed to take the entire output of the mine.

LAWRENCE COUNTY.

The National M. & S. Co., recently organized, will erect a smelter in Bear Butte district, near Galena; it will be in operation June 1st.——Hardin Bros. may put up smelting works on Redwater, 12 miles north of Deadwood.——E. May and others of Lead, owners of the Realization group in the Garden City district, 5 miles northwest of Deadwood, will probably build a cyanide plant there this spring; a shaft is sunk on the property, and a body of ore 150 feet wide is reported opened up.——At North Lead, the Golden Crown cyanide plant, recently enlarged to fifty tons daily capacity, is running.——The Pluma M. Co. will resume operations on mine and mill at Pluma this month.——The Imperial G. M. Co. has about completed arrangements for the erection of its 100-ton cyanide plant in Deadwood.

PENNINGTON COUNTY.

The Crown Hill M. Co. will soon resume operations on the Spokane, near Keystone; the 50-ton concentrating plant will be enlarged to 100 tons capacity and the shaft will be sunk to the 500-foot level; it is said that as soon as the concentrating plant is in operation, after enlargement, the company will erect a cyanide plant to treat ore from the Crown Hill, 1 mile east of Ragged Top.——The Gopher M. Co. is putting in a 50 H. P. gasoline engine at the Lena, 4 miles north of Hill City.

UTAH.

BEAVER COUNTY.

Ore from the Canadian of the Canadian M. Co., at Milford, assays 4% copper and $1.20 gold to the ton.

The Horn Silver, at Frisco, is shipping steadily.

BOX ELDER COUNTY.

Average value per ton returned from ore at the Century, Park Valley, is about $7.50.

Two new mills will probably be built at Park Valley during this year.

CARBON COUNTY.

Anthracite coal is reported found 8 miles north of Price.

GRAND COUNTY.

The La Sal at Paradox is shipping ore. ——The mill at Miner's Basin is shut down temporarily.

JUAB COUNTY.

Ore is being taken from the 200-foot level of the Star Con., at Tintic; the 600-foot level is being extended to tap the chute; Manager Packard.——A whim is going in on the Tiernan, North Tintic. ——Good ore is opened up in the East Buckeye, at Tintic.

S. Bamberger of the Lower Mammoth, at Tintic, says that ore recently opened up on the 800-foot level of that mine will run 15% copper.——A station is being cut on the 600-foot level of the El Rey; Supt. T. L. Walden.——The Enterprise, Enterprise No. 2 and the I X L No. 1, at Tintic, will be operated by the Vira M. Co., recently incorporated at Provo City.

Copper ore is reported opened up on the 800-foot level of the Lower Mammoth, at Tintic.

Sinking will be resumed on the Lower Mammoth, at Tintic, and shaft will go to the 900-foot level.

Supt. Reid is taking out ore from the new strike recently made in the Galena, at Fish Springs; ore is said to run 30% lead and ninety-five ounces silver to the ton.

Work on the D. & B. group at North Tintic is going ahead.——The shaft on the Tesora at Diamond is down over 400 feet.——The shaft on the Ridge & Valley, Tintic, will go to the 725-foot level.——At the Little Chief drifting both ways is in progress on the 600-foot level.

The mill of the Eureka Hill M. Co., at Eureka, is closed down; operations underground, however, are under way.——The Galena M. Co. of Fish Springs has levied an assessment of 5 cents per share—$5000 —to be applied toward an indebtedness of $8000; Manager Joseph will soon ship some ore from the property. —— The Gemini, at Eureka, has resumed shipping ore.

The Shoebridge-Bonanza, at Tintic, Supt. Caruthers, is shipping ore regularly. The ore runs from 5.2% to 34.8% copper, 11 to 77 ounces silver and from 22% to 30% iron.

SALT LAKE COUNTY.

Operations on the Bazouk, at Bingham, are resumed; a new shaft is going down.

The Red Wing Co. of Bingham recently shipped twenty-two tons of ore from the Wolfe lease which ran 10% copper, twenty-five ounces silver and $1.60 gold to the ton.

The Dewey mill, at Bingham, is running on silver-lead ore carrying gold and copper from the Northern Light, at that point.

The new rolling stock for tunnel No. 7 of the Highland Boy, at Bingham, is going in. When finished, all ore is to be taken through this tunnel. During 1901 the smelter will treat 450 tons daily.——Assays on ores from the Ben Butler, at Bingham, show them to run 30% lead, 6 ounces silver and $1 gold to the ton. Supt. McQueen is driving an upraise.——Work on the Copperhead, in Detroit district, will be resumed soon, it is thought.——A mill will probably go in on the Charm, same district; G. Ormsby, Supt.

SUMMIT COUNTY.

During last week the Marsac mill, at Park City, handled over 200 tons of ore from the Daly-West, near there; ore came from the 1200-foot level.——The rumor that the Daly-West and Ontario will consolidate is denied.——A strike of good ore was made recently on the New Sensation, in Big Cottonwood; ore carries gold, silver and lead, and was opened up at the bottom of the winze at a depth of 140 feet. ——Three shifts are working in the Alliance tunnel drifting towards Union ground in a northerly direction; they are in about a mile.

A find of a good body of ore is reported from the Valeo, at Park City.

TOOELE COUNTY.

At Grantsville the old tunnel of the Bell M. Co. is being extended; a new tunnel may be run to tap the vein at a depth of 450 feet.

The Sunshine mine and mill, at Sunshine, Camp Floyd district, are reported sold for $312,500; contract calls for completion and operation of a mill of 300 tons daily crushing capacity, with a leaching capacity of 750 tons, within 6½ months from date of sale; mill is to run continuously on 200 tons of ore daily; G. C. Moore will be manager. —— The new electric motor at the Con. Mercur, at Mercur, is now hauling ore over the tracks of the tunnel and tramway to the mill.

The new furnace at the Sacramento, at Mercur, is nearly completed.

The Vira M. Co., capital $25,000, is incorporated at Provo City.

The Brickyard, at Mercur, will resume operations; twenty men will be put on.

UINTAH COUNTY.

The Hyde-Cunningham Co., operating asphaltum properties south of Ashley valley, near Vernal, has put on more men. ——In the Jesse McEwing mining district it is said that an Eastern company will take hold of the O'Neil-McCune copper properties and develop them.——C. O. Baxter has bought twenty-one asphaltum claims in the White River district for $9100.

WASHINGTON.

FERRY COUNTY.

Supt. M. Hodges of the Princess Maud, Republic, has made his annual report to the shareholders of the company, showing a satisfactory state of affairs at the mine. ——The California M. Co. at Republic will put in a new steam hoist on the California.—— The crosscut tunnel on the Bodie, on Toroda creek, a few miles north of Republic, has cut a 12-foot ledge of good ore at the 430-foot mark.

OKANOGAN COUNTY.

The Review, Meyers Creek district, near Chesaw, is making preparations to ship steadily to the smelter.——The Yakima will also begin shipping.——The Interstate M., M. & D. Co. of Columbus, Ohio, will begin work on the Delate, adjoining the Review.——The Monterey G. M. Co. has run its tunnel into Buckhorn mountain 400 feet.——Work on the War Eagle will resume soon.——The Poland China is reported sold. Work will begin shortly.

The tunnel on the Lakeview, on Mt. Ellmeham, now in 200 feet, will be driven an additional 125 feet.

STEVENS COUNTY.

The shaft on the Anderson, 9 miles from Valley, is down 100 feet; ore from this depth carries copper and gold; King G. & C. M. Co., owners; Manager McAviney.

WHITMAN COUNTY.

The new hoist for the Blue Bird, in the Hoodoo district, 35 miles east of Palouse, and operated by the Chickasaw M. & S. Co., M. W. Truax Supt., is going in. Two shifts will be put on. Shipments begin next May.

WYOMING.

BATTLE LAKE COUNTY.

Ore running 30% copper is opened up in the 115 and 190-foot levels of the Battle Lake Rambler, near Battle Lake.

FOREIGN.

AUSTRALASIA.

During 1900 the gold production amounted to $75,283,215.

BRITISH COLUMBIA.

The output of the Sullivan for December was 1370 tons. A new tunnel will be run.——Three tunnels are run on the Bill Nye, on Trail creek.——A 100-foot tunnel will be driven on the Stanley.——On the St. Lawrence a 100-foot tunnel is completed. During 1900 the mines of Southeast Kootenay shipped 35,753 tons of galena ore, having a valuation of $1,923,580. —— In 1900 the North Star shipped 15,513 tons of galena ore, having an average value of about $50 per ton, a total of $775,650.——The St. Eugene Con. mines have shipped 13,593 tons of concentrates during 1900, which, at the ratio of 3 to 1, means an output of 40,779 tons of crude ore, valued at $815,580.——The output of the Society Girl for the year 1900 is given as $50,000.——The main tunnel on the Blue Grouse, on Sand creek, near Cranston, is in over 200 feet.——Work will continue through the winter on the Waterfall.——Another company is seeking incorporation at Greenwood to run a tunnel from Greenwood to Phœnix, or from Grand Forks to Phœnix. If the project goes through the tunnel will pass under the center of Phœnix camp at a depth of 2025 feet.——The Wagner group, in the Lardeau, is reported bonded to F. Watson, representing New York men, for $100,000.——Nineteen tons of ore from the Bondholder group, on Springer creek, near Slocan, recently shipped to the Hall Mines smelter at Nelson, returned 224 ounces silver and 7% lead to the ton.——The War Eagle shaft, Rossland, now down 1200 feet, is the deepest in the Kootenay country. No. 1 shaft, now down 600 feet, will be sunk an additional 100 feet.——The five-compartment shaft at the Le Roi, now down 900 feet, will be sunk to the 1000-foot level.——Drifting is in progress on the 400-foot level of the Evening Star.——The management of the First Thought, near Nelson, contemplate putting in a cyanide plant this spring. Twenty men are blocking out ore, etc. A depth of 175 feet has been attained.——On the Easter Sunday the diamond drill has reached a depth of 100 feet.——The shaft on the Montana of the Union G. M. Co., Manager Cooper, is down 90 feet. Sinking will be continued.

INDIA.

Output of gold for the year 1900 is given as 457,020 ounces; yield for 1899 was 410,678 ounces; output of oil for 1900 was 32,934,007 barrels, and for 1899 it was 18,973,978 barrels.

MEXICO.

The Creston-Colorada Co. own the old Minas Prietas mine and the Creston, adjoining it on the west, at Minas Prietas, where the principal machine and carpenter shops and roaster of the company were situated; also, the La Mina Colorada, less than a mile west of Minas Prietas, at La Colorada. The Wyman shaft is a new vertical shaft, which has been sunk on the Colorada vein east of the old incline shaft, for greater ease and economy in working. They have developed good ore bodies during the two years that development work has been going on. The company also own other claims; but these are the principal ones worked. When everything is ready, they will supply the mill with ore from the Wyman shaft while they look for other ore bodies in the Creston and Prietas mines.

La Colorada, Sonora, Mexico, Jan. 10.

The chairman of the Palmarejo & Mexican Gold Fields, Ltd., is giving the properties an examination with view of changing manner of working the ore. The old Palmarejo mine, last year reported worked out, is again yielding large quantities of 20-ounce ore (silver); the mill runs on full time.

The White Chief Co.'s mill at Agua Caliente is hammering away and the mine is reported in bonanza.

The Abundancia and Reliz de Tetamoa properties, idle since 1894, are being reopened by Gedney & Young, who report a 5-foot vein of high-grade ore, and will start the 10-stamp mill Feb. 1st.

The expert who came to examine the Piedras Verdes, near Alamos, Sonora, has the refusal of the property until Jan. 20 at $1,500,000.

The Three H Co., at Guazaparas, is getting in shape to produce bullion. This is counted one of the best properties in this section.

C. Doane and W. Morgan are examining the Ramos mines with view of purchasing.

Chinipas, Chihuahua, Jan. 3.

Commercial Paragraphs.

THE Modern Machinery & Electrical Co. of Denver, Colo., supersedes the Coal Machinery Co.

H. D. CRIPPEN, 52 Broadway, New York, has assumed control of the Jackson hand power rock drill as sole licensee and manufacturer, his Western office being at 1756 Lawrence street, Denver, Colo.

THE Chicago Pneumatic Tool Co. has purchased the plant and business of the Great Western Pneumatic Tool Co. in Denver, Colo., and will manufacture the Schmucker drill and air compressors at the Denver shops, of which C. H. Skinner is manager.

THE Robert Aitchison Perforated Metal Co., 303 Dearborn street, Chicago, report being busy on orders for perforated metals for use in fanning mills, ice machines, clay screens and cottonseed oil machinery, besides small orders for repair work, and say that 1901 is starting out with every evidence of continued prosperity in their line.

Recently Declared Mining Dividends.

	Payable.
Portland M. Co., Colorado, 6 cents per share, $180,000	Jan. 5
Doctor-Jack Pot M. Co., Colorado, 1 cent per share, $29,000	Jan. 5
Butterfly-Terrible M. Co., Colorado, ½ cent per share	Jan. 28
Center Star M. Co., British Columbia, 1 cent per share	Feb. 1
New Zealand G. M. Co., Colorado, 10 cents per share, $60,000	Jan. 10
Vindicator G. M. Co., Colorado, 2½ cents per share, $27,500	Jan. 25
Gwin M. Co., California, seventeenth dividend, $15,000, total to date $166,500	Jan. 15

Catalogues Received.

The catalogue of the Ludlow-Saylor Wire Co., manufacturers of wire cloth, gives just the kind of illustrated information probable purchasers of that article would want, and can be had upon request, of the Ludlow-Saylor Wire Co., Fourth and Elm Sts., St. Louis, Mo.

Personal.

J. H. BEMIS of Salt Lake, Utah, is in Reno, Nev.

J. L. BRYSON of San Francisco is in Nevada City, Cal.

G. W. MILLER of Denver, Colo., has gone to New Mexico.

J. B. BLACK has returned to Salt Lake, Utah, from Hailey, Idaho.

T. BUZZO, Supt. Alice, Walkerville, Mont., is in Salt Lake, Utah.

J. F. AUSTIN of the Germania smelter, Utah, goes to Everett, Wash.

MANAGER EFFINGER of the Ophir, Stateline, Utah, is in Colorado.

I. JENNINGS has returned to northern Arizona from Salt Lake, Utah.

G. K. FISCHER of the Highland Boy, Bingham, Utah, goes to Mexico.

T. R. MANN, manager Logan, Wall Street, Colo., is in Pennsylvania.

G. S. PEYTON, treasurer Royal Copper Co., Frisco, Utah, has gone East.

A. B. WILCOX has returned to Oroville, Cal., from Colombia, South America.

CHAS. BUTTERS has returned to Oakland, Cal., from Salt Lake City, Utah.

C. D. GROVE, manager Atlas Reduction Works, Boulder, Colo., goes to Europe.

W. H. CUSHING, owner De la Fontaine, Stockton Hill, Ariz., is in San Francisco.

D. MCVICHIE of Salt Lake, Utah, has returned there from Bland, New Mexico.

HAROLD T. POWER has returned to Placer county, Cal., from San Francisco.

J. DUNLAP, Supt. Deadwood, Forest Hill, Cal., has returned there from San Francisco.

L. J. ROSE, JR., president Home M. Co., Nevada City, Cal., has returned to Oxnard, Cal.

W. D. CURTIS, the southern California representative of this paper, is in San Francisco.

H. MOULTON of Butte, Mont., is in De Lamar, Nev.; from there he goes to Eureka, Utah.

C. W. CADLE of the Globe Iron Works, Stockton, Cal., has returned there from San Francisco.

O. E. WELLER of Boston, Mass., managing director Bingham C. & G. M. Co., is in Salt Lake, Utah.

G. E. BAILEY, M. E., has returned to San Francisco from a professional visit to San Bernardino county, Cal.

C. D. FOWLER of Oakland is the new Supt. of the Mineral Mountain, or Frost mine, Hungry Mouth, Sierra county, Cal.

H. A. COHEN, president and general manager Consolidated Mercur, Mercur, Utah, has returned there from New York.

LEO VON ROSENBERG of New York is in San Francisco from the East and Colorado, where he had been examining mining property.

C. L. VAWTER, United States Marshal at Nome, Alaska, has resigned. F. H. Richards of Washington is recommended for the vacancy.

C. HENROTIN of the Highland Boy smelter, Bingham, Utah, goes to Cape Town, S. A., to accept a position with the DeBeers Con. M. Co.

J. T. DONOHUE, former Supt. Mammoth, Tintic, Utah, goes to Cassiar county, Idaho, to take charge of property of the Melcher M. Co.

S. C. GARNER, general foreman of the Jeanesville Iron Works Co., Jeanesville, Pa., recently visited that company's branch offices in Butte and Denver.

JAS. G. BLACK, professor of mining at the Dunedin, New Zealand, University, is in California to make a report to his Government on California mining methods.

I. J. SELIGMAN, financial agent M. Guggenheim's Sons of New York in Mexico, says that the negotiations for the purchase of the Guggenheim smelting and mining interests by the American Smelting & Refining Co. have been completed. The price paid for the Mexico property was $35,000,000 in gold.

Notices of Recent Patents.

Among the patents recently obtained through Dewey, Strong & Co.'s SCIENTIFIC PRESS U. S. and Foreign Patent Agency, the following are worthy of special mention:

STIFFENER FOR APPAREL CORSETS.—No. 665,644. Jan. 8, 1901. W. W. McCormick, Santa Rosa, Cal. This invention is designed to provide an improved stay, such as are used in the fitting of dresses and similar garments, and which cover the interior seams and are afterwards stitched on with any ornamental stitch, and suitably fixed in place. The object of this invention is to provide a convenient means for stitching or securing the stays in place, said means being integral with and forming a part of the stay itself. It consists of an interior elastic body, an outer covering of fibrous or woven material projecting beyond the edges of the body, lacing cords attached permanently thereto, and having tips by which they may be passed through the woven portion and stitched to the part where the stay is to be attached, said cords fastening together at their free ends, and a flap or covering adapted to fold over said fastened portions.

SOFA BED.—No. 665,645. Jan. 8, 1901. Amos Schrock, San Francisco, Cal. This invention provides for improvements in that class of furniture known as sofa beds, and allows a sofa or davenport to be transformed into a bed or couch. It consists of a base, a seat and back portion hinged to each other and to the rear of the base, and adapted to be opened about the latter connection and to be extended in a plane with each other. A section is hinged to the front of the base and provided with an open bottom to serve as a receptacle for bed clothing. This section lies within the base and is turnable outwardly about its hinges to stand in line with the other two sections, while foldable supporting legs serve for the extended sections.

CAN AND COVER.—No. 665,618. Jan. 8, 1901. J. R. Scott, Oakland, Cal. Assignor of three-fifths to C. S. MacMullan and M. J. Keller of same place. The object of this invention is to provide improvements in cans and the covers therefor, so that when the cover is in position upon the can, and the latter enveloped in the usual label which encloses both the cover and can, it provides a ready means for separating the wrapper on the line between the can and the cover, so that the latter can be easily removed. It consists of a can body having an annularly depressed groove or channel removed from its upper edge, and a substantially tight cover having its corresponding groove or inwardly beveled portion at such a distance from the lower edge as to allow the latter to coincide with the groove of the can while the bevel of the cover rests upon the upper edge of the can.

List of U. S. Patents for Pacific Coast Inventors.

REPORTED BY DEWEY, STRONG & CO., PIONEER PATENT SOLICITORS FOR PACIFIC COAST.

FOR THE WEEK ENDING JAN. 8, 1901.

665,715.—VEHICLE TIRE — C. F. Allen, Hueneme, Cal.
665,847.—ANIMAL TRAP—R. M. Barton, Los Angeles, Cal.
665,728.—IRONING TABLE—H. C. Burch, Amity, Or.
665,670.—GASOLINE BURNER — H. B. Cary, Los Angeles, Cal.
665,509.—SEED POTATO CUTTER—Chrysler & Mills, Woodburn, Or.
665,596.—PRINTING BLOCK—L. D. Clark, Red Bluff, Cal.
665,773.—GOLD SAVING APPARATUS—F. J. Drake, S. F.
665,653.—ANTI-FRICTION BEARING—E. A. Faller, S. F.
665,735.—EARTH AUGER—N. H. Hansen, Westport, Wash.
665,853.—GAS GENERATOR—D. H. Hogue, Tacoma, Wash.
665,791.—MORTISING MACHINE—I. Lightner, Caliente, Cal.
665,745.—GAS GENERATOR—P. L. Linehan, San Jose, Cal.
665,746.—TOE CLIP TRIP—S. J. Madson, Newberg, Or.
665,614.—SOLE TRIMMER—E. F. Maxwell, S. F.
665,644.—CORSET STIFFENER — W. W. McCormick, Santa Rosa, Cal.
665,645.—SOFA BED—A. Schrock, S. F.
665,618.—CAN AND COVER—J. R. Scott, Oakland, Cal.
665,808.—SAW SET — I. Steele, Colby, Wash.
665,620.—TAILINGS SAMPLER—Stephens & Munger, Redding, Cal.
665,843.—CARRIAGE IRON—F. J. Wagner, Dallas, Or.
665,498.—EXHIBITOR — C. H. Wright, Eureka, Cal.

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Latest Market Reports.

SAN FRANCISCO, Jan. 17, 1901.

SILVER—Per oz., Troy: London, 29½d (standard ounce, 925 fine); New York, bar silver, 63⅝c (1000 fine); San Francisco, 63½c; Mexican dollars, 50½c.

COPPER.—New York: Lake, 1 to 3 casks, $17.25 cash; carload lots, 17.00; Electrolytic, 1 to 3 casks, 16.87½; carload lots, 16.62½; Casting, 1 to 3 casks, 16.75; carload lots, 16.50. San Francisco: 18. Mill copper plates, 20c; bars, 22@23c.

LEAD.—New York, $4.37½; Salt Lake City, $4.00; St. Louis, $4.20; Missouri lead, $4.32½ desilverized lead; San Francisco $5.00, carload lots; 5½c 1000 to 4000 lbs.; pipe 6½, sheet 7½, bar 6c; pig, $4.70 @5.10. London, £16 7s per ton.

SPELTER. — New York, $4.15; St. Louis, $3.95; London, £19 per ton; San Francisco, ton lots, 5½c; 100-lb lots, 6c.

ANTIMONY.—New York, Cookson's, 10c; Hallett's, 9½c; San Francisco, 1000-lb lots, 12c; 300 to 500 lbs., 13@14c; 100-lb lots, 15@18c.

IRON.—Pittsburg, Bessemer pig, $13.50; gray forge, $13.75; San Francisco, bar, per lb., 2.65c in small quantities.

STEEL.—Bessemer billets, Pittsburg, $19.75; open hearth billets, $21.00; San Francisco, bar, 7c to 12c per lb.

TIN.—New York, pig, $26.50; San Francisco, ton lots, 29c; 1000 lbs., 29½c; 500 lbs., 29½c; less, 30c; bar tin, ₱ lb, 35c.

QUICKSILVER. — New York, $52.50; London, £9 2s 6d; San Francisco, local, $48.50 ₱ flask of 76½ lbs.; Export, $45.

NICKEL.—New York, 50@60c ₱ lb.

MAGNESIUM.—New York, $3.00 ₱ lb.; San Francisco, $4.00.

ZINC.—San Francisco, 5½c; slab, 5¾c; bar, 7c.

BABBITT METAL.— San Francisco, No. 1, 10c.

SOLDER. — Half-and-half, 100-lb. lots, 18½c; San Francisco, Plumbers', 100-lb. lots, 15½c.

ASSAY LITHARGE.—San Francisco, 10c ₱ lb, small lots.

BISMUTH.—New York, ₱ lb., $2.25 50-lb lots; San Francisco, $2.50 to $2.75 lb lots.

PLATINUM.—San Francisco, crude, $17 ₱ oz.; New York, $18.20 per Troy oz

ALUMINUM.—New York, No. 1, 99% pure ingots, 35c; No. 2, 90%, 30c to 35c.

FERRO-MANGANESE. — Pittsburg, 80%, domestic, $85, large lots.

PHOSPHORUS.—F. o. b. New York 50@60c ₱ lb.

POWDER.—F. o. b. San Francisco: No. 1. 70% nitro-glycerine, per lb., in carload lots, 15½c; less than one ton, 17½c. No. 1*, 60%, carload lots, 13½c; less than one ton, 15½c. No. 1** 50%, carload lots, 11¾c; less than one ton, 13¾c. No. 2, 40%, carload lots, 10c; less than one ton, 12c. No. 2* 35%, carload lots, 9½c; less than one ton, 11½c. No. 2** 30% carload lots, 9c; less than one ton, 11c. Black blasting powder in carload lots, minimum car 728 kegs, $1.50 per keg; less car lots, $2 per keg.

CAPS.—3x, $5.50 per 1000; 4x, $6.50; 5x, $8; Lion, $9, in lots not less than 1000.

FUSE.—Triple tape, $3.60 per 1000 feet; double tape, $3.00; single tape, $2.65; Hemp, $2.10; Cement No. 2, $3.00; Cement No. 1, $2.65, in lots of 3000 feet and up.

CANDLES.—Granite 6s, 16 oz., 40s., 11½c ₱ set; 14 oz., 40s., 10c.

CHEMICALS.—Cyanide of potassium, 98%-99%, jobbing, 32½@33½c ₱ lb.; carloads, 30@31c; in 10-lb. tins, 40c; sulphuric acid, in carboys, 66% B, 2c ₱ lb.; soda ash, $1.60 ₱ 100 lbs. 58%; hyposulphite of soda, 2¾@3c ₱ lb.; blue vitriol, 5½@6c ₱ lb.; borax, concentrated, 7@8c ₱ lb.; chlorate of potash, 12@13c; roll sulphur, 6c; alum, $1.90@2.00; flour sulphur, French, 2¼@2½c; California refined, 1¾@2c; nitric acid, in carboys, 8c ₱ lb.; caustic soda, in drums, 3@4c ₱ lb.; Cal. s. soda, bbls., $1.00; sks, 95c ₱ 100 lbs.; chloride of lime, spot, $2.50@2.60; nitrate of potash, in kegs, 8c; caustic potash, 10c in 40-lb. tins.

EUREKA CONSOLIDATED DRIFT MINING COMPANY.—Location of principal place of business, San Francisco, California; location of works, Placer County, California.

Notice is hereby given, that at a meeting of the Board of Directors, held on the 11th day of December, 1900, an assessment (No. 28) of one-half cent per share was levied upon the capital stock of the corporation, payable immediately in United States gold coin, to the secretary, at the office of the company, Room 31, 214 Pine street, San Francisco, California.

Any stock upon which this assessment shall remain unpaid on the 15th day of January, 1901, will be delinquent, and advertised for sale at public auction; and unless payment is made before, will be sold on TUESDAY, the 5th day of February, 1901, to pay the delinquent assessment, together with the costs of advertising and expenses of sale.

By order of the Board of Directors.

GEO. W. DIXON, Secretary.

Office—Room 31, 214 Pine street, San Francisco, California.

POSTPONEMENT.

The date of the delinquency of the foregoing assessment (No. 28) has been postponed to TUESDAY, the 29th day of January, 1901, and the day of sale from the 5th day of February, 1901, to TUESDAY, the 12th day of February, 1901.

By order of the Board of Directors.

GEO. W. DIXON, Secretary.

Office—Room 31, No. 214 Pine street, San Francisco, California.

SITUATIONS WANTED.

Experienced licensed land and mine surveyor, competent at assaying and report work, bookkeeping and photography, wishes a position for three months or less. Partial outfit. References exchanged. H. W. H. Pennington, Santa Cruz, Cal.

POSITION AS MILL MAN OR VANNER MAN. Capable of taking charge of mill. Can give good references.

Address J. H.,
40 Pond Street, San Francisco, Cal.

POSITION WANTED by a first-class all round mining man of wide experience and up to date in mining, milling and concentrating, with business qualifications and an accurate assayer. First-class testimonials. Address "Mining," care Mining and Scientific Press.

WANTED—A position as superintendent for a mining company by a man of 16 years' practical mining experience; understands mining and milling (amalgamation, concentration and leaching); good assayer and accountant; would accept a subordinate position if good; references. Address "Advertiser," 1225 Webster St., Oakland, Cal.

Situation Wanted by Mining Engineer of 20 years' experience in California, Colorado, Mexico and Germany. Has had charge of large properties—gold, silver, lead, copper, sulphur and oil. College graduate; good assayer, surveyor and accountant; speaks Spanish. Has experience in railroad construction and road building. Formerly U. S. deputy mineral surveyor and member of geological field force. Will go anywhere. Address P. M., Mining and Scientific Press.

Experienced Metallurgist and Chemist of high standing, with first-class references, is open for immediate engagement as superintendent of a lead smelting or cyanide or chlorination plant, preferably located in California, Arizona, or Montana. Would be willing to accept moderate salary with small interest in plant or lease same. Address M. J. E., 1022 South 14th Street, Denver, Colorado.

CHEMIST AND ASSAYER, with experience in draughting, bookkeeping and typewriting, desires position as assayer or assayer and bookkeeper in mine or as secretary to mining engineer or mine official. Has fair literary and scientific education. Experience in the preparation of reports, prospectuses and catalogues. Excellent moral character and good health. For further particulars, address E. K. M., care Mining and Scientific Press.

Mining Accountant and Store Manager.

A young man of energy and ability, and thoroughly experienced in all details of mine accounting, store managing, buying, contracting, etc., is desirous of obtaining an opening. Is fully qualified to assume full charge of such work or to render general assistance. Highest references will be furnished and satisfactory services guaranteed. Address B. P. O., this office.

WANTED.

WANTED.

A Second-Hand Automatic Cut-Off Engine.
40 H. P. OR 45 H. P. IN GOOD ORDER.
Address MINING CO., Box 10, care of this office.

WANTED.
Assayer, Chemist and Surveyor,
with Surveying Instruments.

Must furnish good references as to character and ability and from previous positions. Give age; experience. Single man preferred. Steady work. Wages $75 per month and board.

Address A. C. S., Box 512, Prescott, Arizona.

Special Meeting of Stockholders.

Notice is hereby given that a special meeting of the stockholders of the RUBY GOLD GRAVEL MINING COMPANY will be held at the principal office of the Company, Room 24, 320 Sansome St., in the city of San Francisco, Cal., on TUESDAY, the 29th day of January, 1901, at 2 o'clock P. M., for the purpose of electing a Board of Directors and the transaction of such other business as may come before the meeting. JOSEPH H. MOOSER,
Secretary Ruby Gold Gravel Mining Company, 320 Sansome St., Room 24, San Francisco, Cal.

BRITISH COLUMBIA MINES.

Gold, Silver-Lead and Copper Properties. Excellent chance for profitable investments in legitimate mining in BRITISH COLUMBIA. Capital needed for developing promising prospects. A specialty made of FREE MILLING GOLD properties. Very promising FREE MILLING GOLD properties for sale; terms reasonable. Mines examined and reported on by reliable mining engineers. Correspondence solicited. Address Andrew F. Rosenberger, P. O. Box 700, Nelson, B. C.

SPECIAL NOTICE.

Capitalists and wealthy syndicates desiring to purchase large operating gold and copper mines, at owners' bedrock prices, can most likely find what they want by corresponding directly with the undersigned. By so doing, buyer and seller can be brought together without the intervention of useless and undesirable promoters, brokers and middlemen. E. J. FRASER, 522-523 Parrott Building, San Francisco, Cal.

HEADQUARTERS FOR
QUICKSILVER.
LOWEST RATES. Correspondence Solicited.
LANGLEY & MICHAELS CO.,
34-40 FIRST STREET, SAN FRANCISCO.

Quicksilver
—FOR SALE BY—
The Eureka Company,
OF SAN FRANCISCO.
ROOM 1, - - 320 SANSOME STREET,
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Carefully Tested.

Each and every injector we make is carefully tested before it leaves our factory, and card attached showing its exact range. When you buy a

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you are getting the best injector on the market. Fully guaranteed as per card attached.

Our "Engineers' Red Book" will be valuable to you. It's free for the asking. Write us.

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WEST COAST OF MEXICO.

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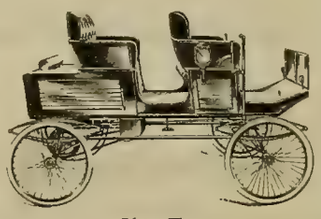
Bankers, Importers, Exporters and Commission Merchants.

Representatives and Agents of the principal Mining Companies in the State of Sinaloa and the dependencies of the Pacific coast in the States of Durango, Chihuahua, Sonora, Lower California and Jalisco.

ORE BUYERS AND EXPORTERS. - MINING SUPPLIES.



No. 5.

The "Locomobile" Company
OF THE PACIFIC.

STATIONS: 1255 Market Street, San Francisco. 103 South Broadway, Los Angeles. 106 Telegraph Avenue, Oakland.

Your choice in nine different styles. Ladies can operate them. Sold in guaranteed condition at reasonable prices. Illustrated catalogues and information will be sent on application.

FOR SALE.

FOR SALE.--- Complete Bucyrus Gravel Washing Plant,

Revolving screen, stacker, pumps, engines, etc. Capacity 2000 cu. yds. per day. For full particulars, address X, this office.

FOR SALE.
Developed Silver-Lead Mines and Prospects,
Parral and Santa Barbara Districts of Mexico.

The coming greatest camp in the Republic. Correspondence solicited

H. E. RUNKLE, El Paso, Texas.

COMPRESSOR AND HOISTS FOR SALE.

1 4-drill Norwalk steam compressor, compound air cylinders.
1 6″x8″ double engine, single reel hoist.
1 8″x10″ double engine, double reel hoist.
1 double reel water or steam hoist.

Machinery all practically new. Convenient for inspection. Address "BARGAIN," P. O. Box P, Auburn, Cal.

GUARANTEED MINING STOCK FOR SALE.

Excellent chance for profit, no chance for loss. Can convince the most skeptical that our way of guaranteeing mining stock is perfectly safe and one of the most desirable investments. Can furnish highest grade of references. Write or call for particulars, if you wish to purchase. on E. N. BREITUNG, Marquette, Mich., or branch office, Washington, D. C.

BOILERS and ENGINES.

We have the largest stock of second-hand Boilers and Engines of all sizes in the West. All sold under written guarantee.

Send for Catalogue No. 37.

THE S. H. SUPPLY CO.,
22nd and Larimer Sts., DENVER, COLO.

BENJAMIN T. LLOYD,
STOCKS, BONDS AND MINES.

Have immediate customers for well-developed Gold and Copper Properties.
P. O. Box 608, SALT LAKE CITY, UTAH.

AUTOMATIC SAMPLING
Mill Plans, Cyanide, Concentration, Smelter.
F. D. BAKER, Mech. Engr., DENVER.

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IN MONTANA.

Over 12 feet wide; values $5 to $30, gold and silver. Mine can be developed cheaply by tunnels to depth of 600 feet. Many improvements; 1500 feet work done; buildings up, and good road; timber and water. Prospect for a big mine seldom equaled. Lease and bond on favorable terms. D. S. M., care this office.

WE BUY very rich Ores, Dental Scraps, Tellurium Ores, Mill Wastes, Jewelers' Sweeps, Gold Retorts, Old Iron Retorts, Base Amalgam, Quicksilver, Amalgamated Plates, Gold and Silver, Old Slags.

A. M. DONALDSON & CO.,
ASSAYERS AND WASTE PRODUCT SMELTERS,
1661 Larimer St., Denver, Colo.

Donaldson's Assayers' Slag Hammer { 1 lb. .....$1.10 / 1 lb. 3 oz. $1.25

MICHIGAN COLLEGE OF MINES.

An Engineering School with unique location, giving it unusual facilities. Distinctive methods of instruction. Special courses given. All work in charge of widely experienced men. Catalogue giving list of graduates and their occupations on application. Address

F. W. McNAIR, Pres't, Houghton, Mich.

RISDON IRON WORKS.

SAN FRANCISCO, CALIFORNIA.

Cable: "Risdon's." Code: A. B. C. & Leiber's.

MANUFACTURERS OF

Gold Dredging Machinery

And COMPLETE EQUIPMENT for Placer Mines OUR SPECIALTY.

—WE BUILD—

GOLD DREDGES Complete in Running Order

to handle 2500 cubic yards per day at a cost of 3 cents per cubic yard.

We excavate 50 feet below water, 20 feet above water and handle boulders up to one ton weight.

SEND FOR DREDGING CATALOGUE NO. 17.

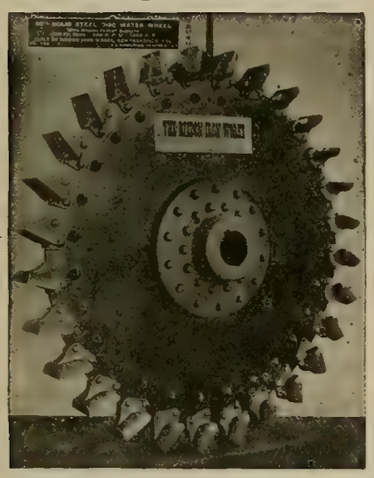
—WE ALSO BUILD—

ALL KINDS OF

Mining, Milling, Concentrating, Pumping, Air Compressing, Hydraulic, Water Wheel, and Hoisting Machinery.

Evans Hydraulic Gravel Elevators.

We publish sixteen catalogues. Write for one in the line you are interested in.



TANGENTIAL WATER WHEELS

MANUFACTURED BY

RISDON IRON WORKS,

SAN FRANCISCO, CALIFORNIA.

We build Water Wheels for any head and for any power. Complete electrical power generator wheels a specialty. Large wheels up to 50 feet diameter for driving compressors.

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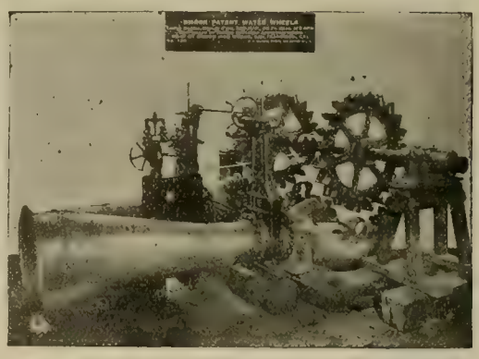
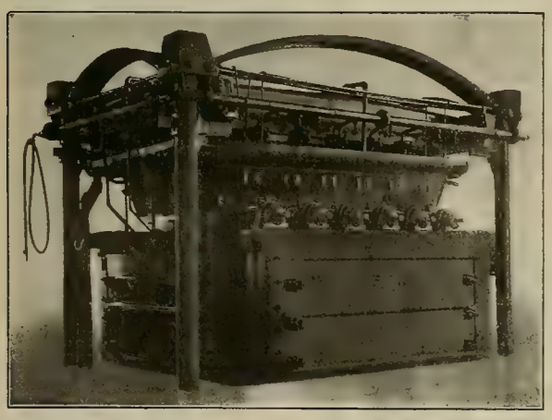


THE COLORADO IRON WORKS COMPANY,



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Smelting Furnaces and Equipments.

The illustration in this advertisement shows one form of our COPPER MATTING FURNACE, employing hot blast; the air being first treated in proper appliance, is conducted through the cast iron bustle pipes placed along the inside of the caisson plates, through the cast iron adjustable tuyeres. This furnace can also be used for silver as well as copper smelting, by changing lining in crucibles. We build them in any size required.

Cold blast may be used if preferred.

The furnace is equipped with our special cast iron jackets, and our patented system of water-jacketed mantles.

Send for our catalogue, showing many different styles of smelters for the treatment of

GOLD, SILVER, LEAD, COPPER AND NICKEL ORES,

also the latest and best method for the economical use of jacket water (a saving of 80% to 90% guaranteed) by our patented

WATER VAPORIZING ATTACHMENT.

We design, manufacture and erect Mills for Concentration and Amalgamation, Milling, Chlorination and Cyanide Processes. In writing for information, give us the analysis or character of the ore to be treated, to enable us to intelligently arrive at the proper method.

Our very complete catalogue of CRUSHING MACHINERY will be sent on application.

THE COLORADO IRON WORKS COMPANY,

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High Grade Machinery.

COMPLETE PLANTS INSTALLED.

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PATENT WATER TUBE

STATIONARY **BOILERS** & MARINE

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MANAGER,

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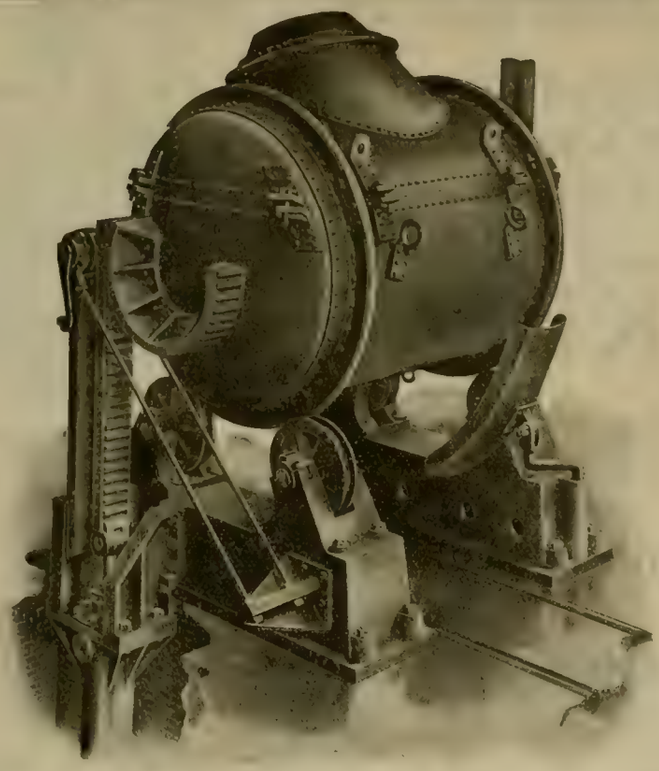

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Mining, Milling and Smelting.. Machinery....

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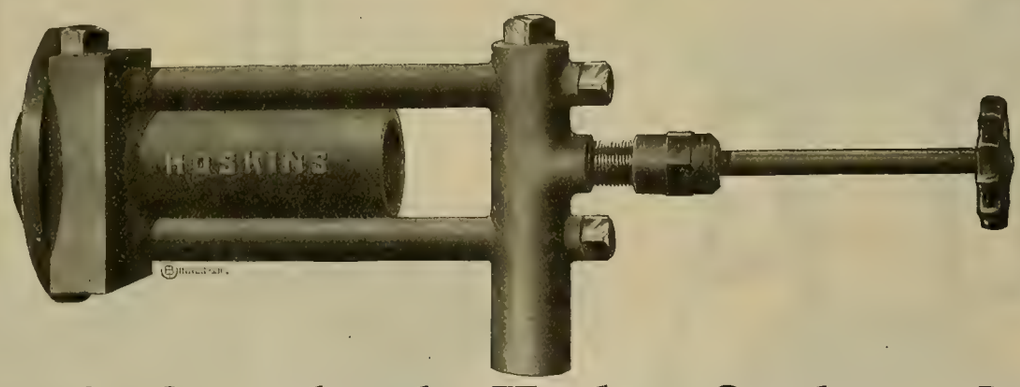
We introduced the use of Liquid Fuel Furnaces for Assaying twenty years ago, and received the only award and medal for Hydro-Carbon Blow-Pipes and Assay Furnaces at the World's Fair in 1893. We are still manufacturing



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FOR ASSAY FURNACES.

Always guaranteed and cleaned or repaired FREE of charge.

For sale by Dealers in Assayers' Supplies everywhere, or by Ourselves.

All inquiries fully answered. Write for circulars and prices of our TIME PROVEN FURNACES FOR ASSAYERS.

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CYANIDE PLANTS.

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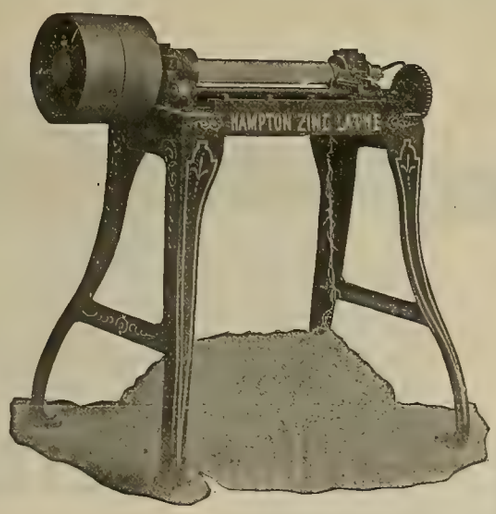

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Zinc Lathes with Automatic Feed

FOR CUTTING ZINC SHAVINGS.

Pacific Tank Co., Manufacturers.

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Joshua Hendy Machine Works,

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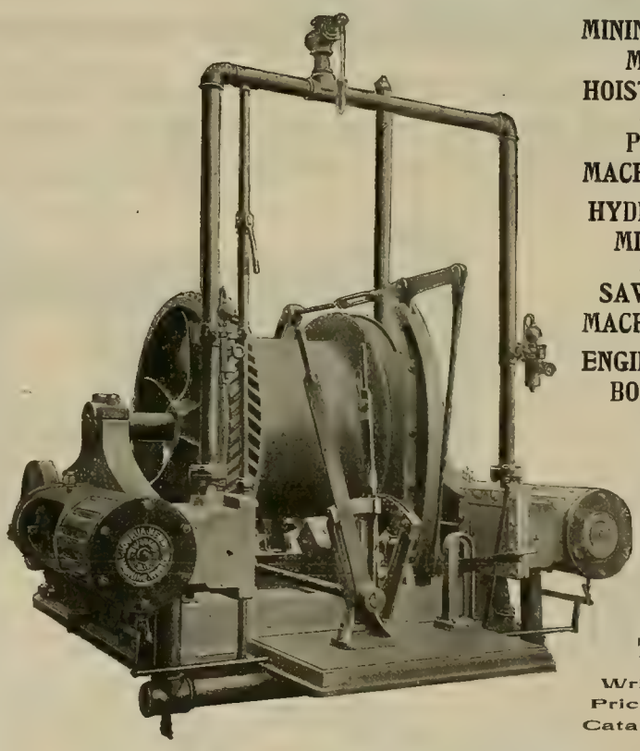

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HYDRAULIC MINING AND SAWMILL MACHINERY.

ENGINES, BOILERS, PUMPS.

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Write for Prices and Catalogues.

DOUBLE CYLINDER SINGLE DRUM HOISTS.

The above form of Hoisting Engine has certain features of construction which make it superior to all others. It is mounted on a single solid base, with standboard for the operator. The engines are reversible link-motion and the drum is fitted with post-brakes which assures quick and safe operation. The design is compact and superior and the construction strong and substantial. We furnish them either with or without clutch pinions. The above cut illustrates an 8½ inch by 10 inch. Other sizes in stock and built to order.

STRICTLY **C. P. ACIDS** and **C. P. AMMONIA**

MANUFACTURED BY The Western Chemical Co., DENVER, COLO.

For Laboratory Use and Fine Chemical Work.

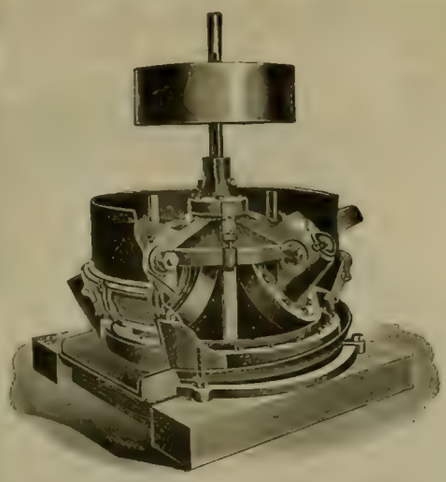
PURITY GUARANTEED.

Also COMMERCIAL ACIDS.

Are You Confronted With a Difficult Ore-Separating Problem?

THE WETHERILL MAGNETIC SEPARATING PROCESS

may prove the solution. Apply to Wetherill Separating Company, 52 Broadway, N. Y.



THE GRIFFIN
THREE ROLLER
ORE MILL.

The Griffin Three Roller Ore Mill is a simply constructed Mill, suitable for working all kinds of ores that require uniformly fine crushing by the wet process. This Mill is a modification of the well-known Chilian Mill, but the rollers run upon a crushing ring or die, which is inclined inwardly at an angle of about 30 degrees, the rollers themselves also being inclined to the central shaft of the Mill, thus utilizing the centrifugal force, as well as the weight of the rollers themselves as a crushing agent. The Griffin Three Roller Ore Mill is therefore a Mill of great strength, and has few wearing parts. We construct these Mills with extreme care, using only the best of raw materials, which are most carefully worked by men who are specialists as mill builders. We sell the Griffin Ore Mill on its determined merits, and will gladly supply full information regarding it to any one.

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Will reach down for Water far below the Surface

Steady application of Motive Power.

Fulton Pump

All Sand entering Valves Carried to Surface.

and Force it long distances above.

Fine Cylinders.

Fine Valves.

Continuous Flow.

A. T. Ames, M'f'r, Galt, Cal.

Leschen Co.'s {Patent Aerial} {WIRE ROPE} TRAMWAY

FOR TRANSPORTATION OF ORE, COAL, DIRT, TIMBER, ETC.

Perfect Grip Clip,
Absolutely Safe,
Loads Automatically,
Unloads Automatically,
Operated by One Man,
Cost of Maintenance Low,
Capacity Largest Obtainable.

ALSO SOLE MANUFACTURERS
PATENT FLATTENED STRAND

[TRADE MARK REGISTERED.]

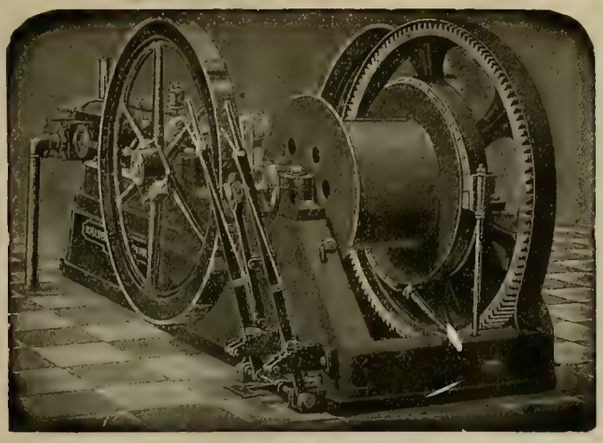
—AND—

Wire Rope
OF EVERY DESCRIPTION.

MANILLA, SISAL, BLOCKS, ETC.

A. LESCHEN & SONS ROPE CO.,

Home Office: 920-922 North Main St., ST. LOUIS, MO. Branch Offices: 92 CENTER ST. (Cor Leonard St.). NEW YORK. 47-49 SOUTH CANAL ST., CHICAGO, ILLS.



FAIRBANKS-MORSE GASOLINE-DISTILLATE GEARED HOISTER.

An efficient and reliable combination of a Fairbanks-Morse Gasoline-Distillate Engine on the same base with a Friction Hoist. Modern and up to date. We publish a special catalogue describing our Hoister which we gladly mail prospective purchasers.

FAIRBANKS-MORSE GASOLINE-DISTILLATE ENGINES.

ALL SIZES UP TO AND INCLUDING 54 HORSE POWER.
For Pumping, Milling, Lighting, Air Compressors, Etc.

FOR CATALOGUES AND FULL INFORMATION, ADDRESS

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310 MARKET ST., SAN FRANCISCO, CAL.
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FIRST AND STARK STS. PORTLAND, OGN.
1600 SEVENTEENTH ST., DENVER, COL.
FRANKLIN AND MONROE STS., CHICAGO, ILL.

CROWN GOLD MILLING CO.

To MINERS and MILLMEN.

If your ores are refractory; if you are losing concentratable values in your tailings; if your mines are in an arid district, or so situated as to make the introduction of water ruinously expensive; if you have large bodies of concentratable ores which could not be profitably treated hitherto,

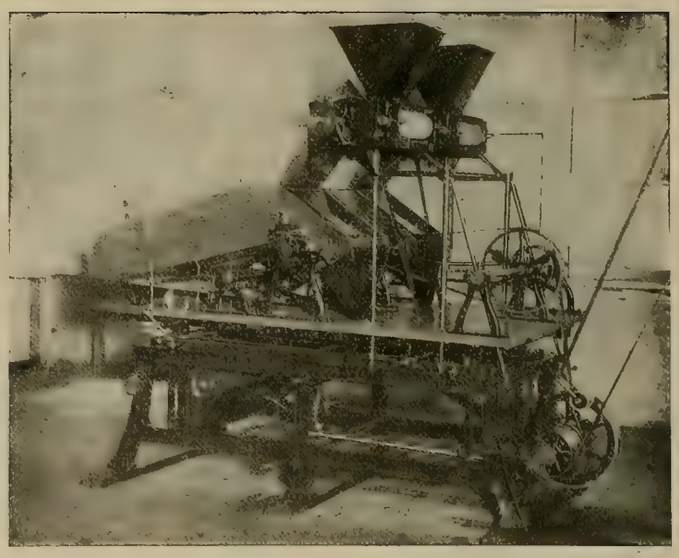
THEN READ WHAT FOLLOWS:

The CROWN GOLD MILLING COMPANY'S concentrating machinery will concentrate any ores, sands or earths carrying metallic particles or metallic combinations of concentratable dimensions.

A shipping product of unexcelled purity is given, the greatest amount of concentratable values extracted, and a greater tonnage of ore is put into a ton of concentrates than by any other system of mechanical treatment. Every pound of ore delivered to machines is accounted for in the ore and concentrate bins.

It will cost you nothing to investigate, and may mean an increased profit on your ores, or a profit on bodies of ores which heretofore have failed to pay more than cost of treatment; or you may be enabled to make a productive property of a mine now idle.

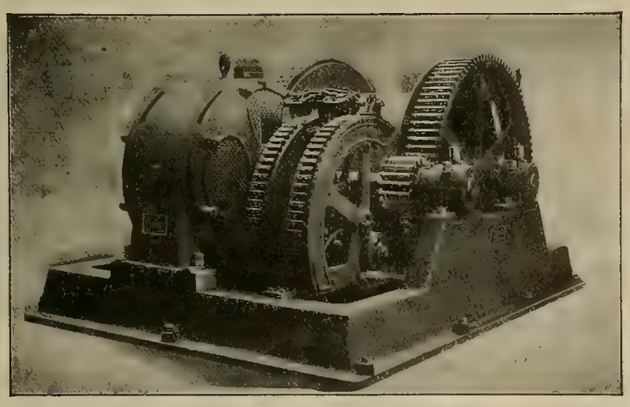
We have a twenty-ton capacity plant in operation. All are invited to call and test it: from 1000 to 2000 pounds ore will be treated as a test. Charge $20, to cover cost assays. Results at mine guaranteed to equal results obtained in testing. Wear and tear and labor cost guaranteed not to exceed cost by wet treatment of same character of ores.



Our machines are not for sale: they are placed on lease or royalty charge as may be agreed upon, and if results are not obtained as guaranteed no one loses but ourselves. Practice is better than theory: direct evidence is better than hearsay. All we ask of you is to come and be convinced that we have claimed less than we accomplish.

Office,.....230 Post St.
Works,.....23 Stevenson St.

SAN FRANCISCO, CAL.



Westinghouse Polyphase Induction Motor Operating Mine Hoist.

WESTINGHOUSE ELECTRIC — THE NAME WESTINGHOUSE IS A GUARANTEE

Westinghouse Motors

Operate Economically Everywhere.

Westinghouse Electric & Manufacturing Co.

All Principal Cities in U. S. and Canada.

Pittsburg, Pa.

650

THE MINE AND SMELTER SUPPLY CO.,

DENVER, - - COLORADO.

Mining and Milling Machinery and Supplies.

We beg to call your attention to

THE FINLAYSON PATENT WIRE ROPE TRAMWAY—

the latest and best system of double-rope automatic aerial tramway in the market.
If interested in the most economical system of transporting ores from mine to mill and to shipping stations, send for our special tramway catalogue.

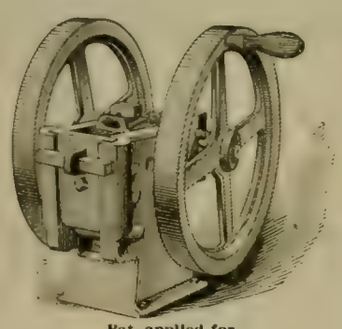
We carry a complete stock of Machinery and Supplies for immediate delivery.

Send for our special catalogues on Mining Machinery, Milling Machinery, Wilfley Concentrators, Tramways, Power Transmission Machinery, Machine Tools, Etc.

THE MINE AND SMELTER SUPPLY CO.,.....Denver, Colorado
THE MINE AND SMELTER SUPPLY CO.,.....Salt Lake City, Utah
THE MEXICO MINE AND SMELTER SUPPLY CO., No. 16 San Francisco St., City of Mexico.

BOILERS, ENGINES, STEAM HOISTERS, ELECTRIC HOISTERS, ROLLS, CRUSHERS, WILFLEY TABLES, CARS, CAGES, ORE BUCKETS, RAIL, PIPE, FITTINGS, BELTING, ETC., ETC.

Time, Labor and Money Saved for Assayers.

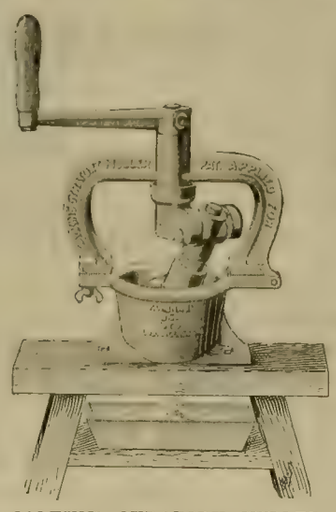


Pat. applied for.

THE SIMPLEX ORE CRUSHER.

For crushing and pulverizing small quantities of ore by either hand or power. It is more easily operated than any other machine of its capacity on the market.

Its features are ease of opening for cleaning and simplicity of adjustment.



CALKINS' GYRATORY MULLER.

A recent invention for reducing crushed ore samples to a pulp. Will quickly pulverize to 100 mesh or finer.

Supersedes the slow and laborious Bucking Plate.

CALKINS' RADIAL BUCKING PLATE.

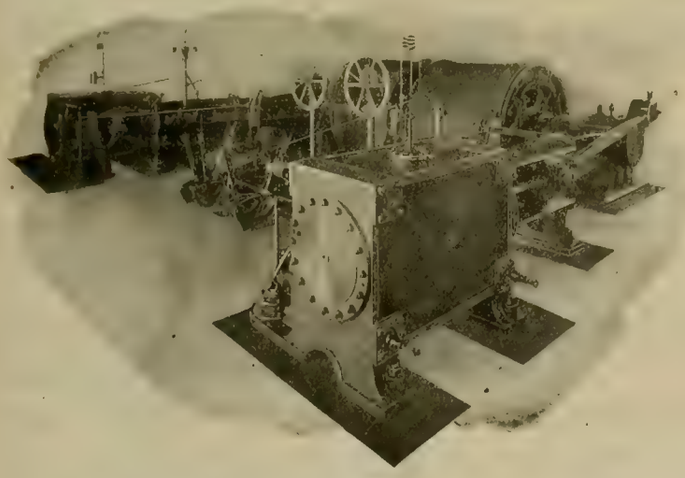
Designed to replace the old method of pulverizing crushed ore samples to a pulp of any desired fineness with but a fraction of the energy required to operate the old style Bucking Board and Muller.

WRITE FOR OUR NEW DESCRIPTIVE PAMPHLET IN WHICH : ALL OUR NEW SPECIALTIES ARE FULLY DESCRIBED. :

F. W. BRAUN & CO.,

Manufacturers of Modern Appliances for Assayers,

LOS ANGELES, CAL.



HIGH CLASS FIRST MOTION

HOISTING ENGINES

Especially Designed

For Heavy Duty and Deep Mine Work.

Built with **CORLISS OR SLIDE VALVE ENGINES** and for either **ROUND OR FLAT ROPE.**

Our line of Hoisting Machinery is the most complete carried by any one concern in the United States. Write us of your wants.

THE HENDRIE & BOLTHOFF M'F'G & SUPPLY CO.,

No. 85. DENVER, - - - - - - COLORADO.

THE IMPROVED BARTLETT CONCENTRATING TABLE.

The only table made that will take the place of jigs and do away with costly and complicated machinery.
Especially designed for separating zinc from lead.
Solid Iron Tops, planed to a true surface.
All parts are interchangeable.
Wearing parts reduced to a minimum.
Capacity from 15 to 45 tons in 24 hours, according to class of ore.

Our illustrated catalogue contains all the latest information on the concentration of ores. Mailed on application.

THE COLORADO IRON WORKS CO.,

Established 1860. DENVER, COLO., U. S. A.

THE IDEAL CONVEYOR BELT

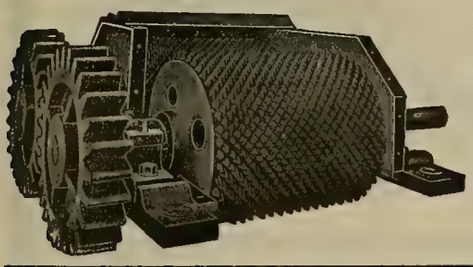
Is the one that will carry stone, ore, coal, wet or dry material, holding buckets firmly and securely; will stand all kinds of exposure, and resist the heaviest strains during a long period of service. This is what the **LEVIATHAN BELT** has done, and we quote the following from a letter from the New York Steam Co.:

"We have used Leviathan Belting for four years, up to 24-inch by 8-ply, elevating and conveying coal. Some of the Belting is outside, exposed to freezing weather; some in a steam bath. In both conditions the results have been very gratifying, over 500 tons having been handled in ten hours time."

MAIN BELTING COMPANY,
1225-41 Carpenter Street, Philadelphia.
55-57 Market St., Chicago. 120 Pearl St., Boston.
SEND FOR PRICE LISTS AND SAMPLE.

LINK-BELT

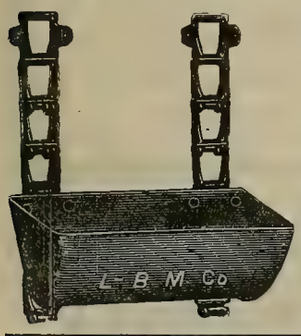
ELEVATORS —AND— CONVEYORS.



BREAKER ROLLS, PICKING TABLES,
MALLEABLE IRON BUCKETS, SHAFTING, PULLEYS, GEARING, CLUTCHES, Etc.
Catalogue Upon Application.

LINK-BELT MACHINERY CO.,
Engineers, Founders, Machinists,
CHICAGO, U. S. A.
DENVER, 1328 17th St.,
A. E. LINDROOTH, Manager.

Small Portable Saw Mills and DRAG SAWING MACHINES FOR RANCHES AND MINES.



Woodworking Machinery.

LINK BELTING, SPROCKET WHEELS, ELEVATOR BUCKETS & BOOTS, TAKEUPS, FRICTION CLUTCH PULLEYS, ETC.

ALL STYLES AND SIZES IN STOCK FOR IMMEDIATE DELIVERY.

JNO. D. EBY,
17 & 19 MAIN STREET, - SAN FRANCISCO, CAL.

For handling Ore, Coal, Tailings and Dredgings. Catalogue mailed on application.
ROBINS CONVEYING BELT CO. Park Row Building, NEW YORK.

TELL US WHERE YOU'RE AT.

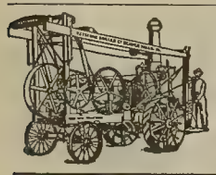
4 Cents Per Ton Per Mile

Is what it costs to transport Ore with our systems of Aerial Wire Rope Tramways.

We'd like to send you our book telling you all about it, but we can't do it unless you write us

WHERE YOU'RE AT.

THE J. H. MONTGOMERY MACHINERY CO.,
DENVER, COLO., U. S. A.



Prospecting Machinery.

Multitudes in use for testing for minerals. Sizes and equipments to suit any and all conditions. Unexcelled for Placer Testing, Oil Wells, Water Wells, testing for Lead and Zinc, Iron and Coal; goes through anything; brings up everything. Large sizes drill as much as 1500 feet. In use all over the world. Every purchaser pleased. Used on boats for testing river and lake beds. Water no hindrance. No skilled labor required.

KEYSTONE DRILLER CO., Beaver Falls, Pa., U. S. A.

DEWEY, STRONG & CO., Patent Solicitors, 330 Market St., San Francisco, Cal.

The Only **GRAND PRIX** (Highest Award)

Given at the PARIS EXPOSITION, 1900, to Builders of

Mining Machinery and Air Compressors

Was Awarded to this Company. In Addition to the GRAND PRIX,

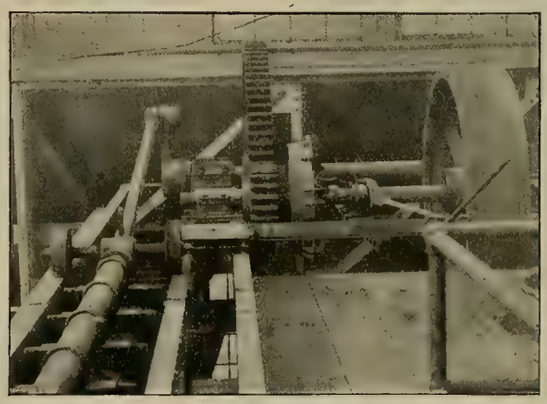
The **GOLD MEDAL** was also Awarded.

The **INGERSOLL-SERGEANT** Drill Company.

26 Cortlandt Street, New York.

RECIPROCATING CONVEYORS

FOR TRANSPORTING QUARTZ, TAILINGS, SAND, ETC.



FEEDING and MEASURING DEVICES.

PERFECT DISCHARGE ELEVATORS.

Complete Installations.

Heyl & Patterson,
PITTSBURG.

IMPROVED GOLD DREDGES.

BUCYRUS COMPANY.

SINGLE LIFT, CONTINUOUS BUCKET TYPE WITH

Working Capacity from 1500 to 5000 cubic yards per day.

IMPROVED GOLD SAVING DEVICE of highest efficiency.

DREDGES CONSTRUCTED COMPLETE UNDER GUARANTEE OF TRIAL RUN.

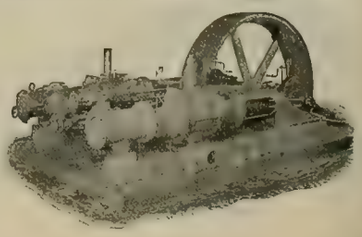
FRANK W. GRIFFIN, Pacific Coast Agent,
Room 508, Safe Deposit Bldg., SAN FRANCISCO, CAL.
WRITE FOR DETAILED INFORMATION. TEL. MAIN 5499.

MACHINERY BARGAINS.

I have some splendid Air Compressors, Hoisting Engines, Rock Drills, Rock Crushers, Channeling Machines, Steam Pumps, Boilers, Steam Shovels, Locomotives and Relaying Rails, all in splendid condition. Send for printed list and specify your requirements. I can save you money. WILLIS SHAW, 627 New York Life Building, CHICAGO.

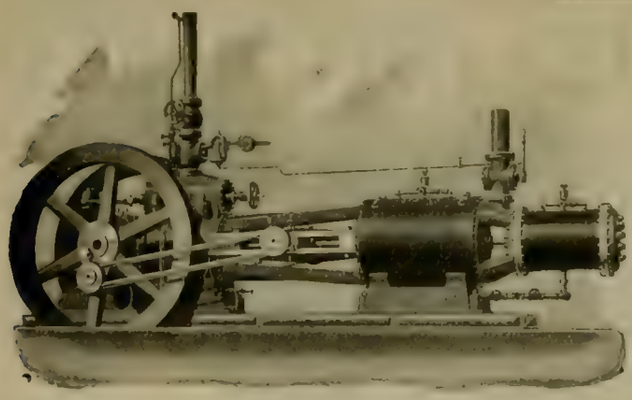
Figure 152 represents our DUPLEX STEAM ACTUATED

AIR COMPRESSOR.



Steam Cylinder Outboard and Detachable.
Can be run as a Power Machine also.

We also build Steam and Power Pumps for Mines.
If interested, address
THE STILWELL-BIERCE & SMITH-VAILE CO.,
276 Lehman St., DAYTON, OHIO, U. S. A.



J. GEO. LEYNER,

OFFICE.....729 Seventeenth Street.
WORKS.....36th and Wazee Streets.

DENVER, COLORADO.

TAKE A LOOK AT IT==

THEN LOOK again! It will bear inspection. Designed for strength and endurance as well as efficiency. Provided with adjustable steam cut-off and automatic governor. Fitted with relief valve. Extra large bearings throughout. Our own improved (patented) inlet valves. Perfectly balanced steam valve. Both cylinders water-jacketed. Perfect inter-cooler.

WHY NOT HAVE THE BEST? It Pays.

Complete specifications would interest you, and we know you would be interested also in the booklet which describes our

NEW LEYNER DRILL.

BULLOCK DIAMOND DRILLS

If you are interested in prospecting send for our new Diamond Drill Catalogue (No. 33).

BULLOCK MINING MACHINERY

PORTABLE HOISTS—Send for our new Catalogue (No. 40). CHAMPION MINE VENTILATORS—Send for our new Catalogue (No. 35).
HOISTING AND HAULAGE PLANTS, ORE CARS, SKIPS, CAGES, ETC., ETC.

PARKE & LACY CO., Agent,
21 & 23 Fremont St., San Francisco, Cal.

M. C. BULLOCK MFG. CO.,
1172 West Lake St., Chicago, Ill., U. S. A.

THE RAND DRILL COMPANY,

PIONEERS IN ROCK DRILLING AND AIR COMPRESSING MACHINERY,

128 BROADWAY, NEW YORK.
223 FIRST ST., SAN FRANCISCO, CAL.
1328 MONADNOCK BLK., CHICAGO, ILL.

Has been awarded

THREE GOLD MEDALS

at the

PARIS EXPOSITION

for

AIR COMPRESSORS and ROCK DRILLS.

THE JACKSON HAND POWER ROCK DRILL.

Works in Any Rock, in Any Position.

Write for Circulars and References.

THE JACKSON DRILL & M'F'G CO.,
1756 Larimer Street, DENVER, COLO.

Sole Licensees for all Foreign Countries and Eastern United States: THORNTON N. MOTLEY COMPANY (INC.), 43 John St., New York.

AGENTS: CHAS. B. BOOTHE & CO., 126 SO. LOS ANGELES ST., LOS ANGELES, CAL.

THEODOR LEXOW, 14 JOHN STREET, N. Y.
.....Importer of.....

CARBONS

(BLACK DIAMONDS)

For DIAMOND DRILLS and all Mechanical Purposes.

HENRY DEMMERT.

Established 1837.

I. C. Yawger,

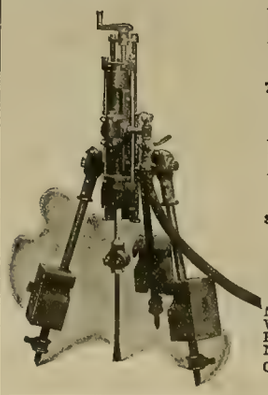
Successor to VICTOR BISHOP & CO.

IMPORTER OF CARBONS FOR DIAMOND DRILLS.

21 Maiden Lane, - NEW YORK.

DIAMOND DRILLS
FOR PROSPECTING.
AMERICAN DIAMOND ROCK DRILL CO.
120 LIBERTY ST N.Y.

SULLIVAN



Diamond Core Drills

FOR PROSPECTING. Catalogue 29.

The most extensive line of sizes and styles ever offered.

CONTRACTORS FOR PROSPECTING WITH DIAMOND DRILL.

ROCK DRILLS

FOR MINING. Catalogue 30.

Superior valve and ratchet motions. The highest possible grade.

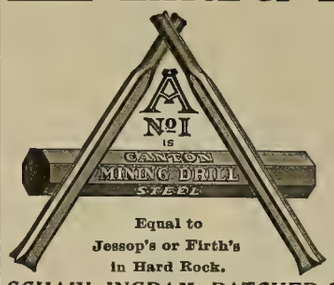
Send for Our New Catalogues.

Sullivan Machinery Co.,

New York. Pittsburg. Claremont, N. H.

Main Office, CHICAGO .....ROOMS 1220-1221, 135 ADAMS ST.
Western Office, DENVER.....431 SEVENTEENTH ST.
Pacific Agency, SAN FRANCISCO, HENSHAW, BULKLEY & CO.
Northwest Office, SPOKANE, WASH.....S-101 HOWARD ST.
Cable Address, Diamond, Chicago. Codes: A. B. C. 4th Edition, Postal Directory, Western Union, Liebers.

FOR Hard Rock Work



Equal to Jessop's or Firth's in Hard Rock.

Canton Extra

WARRANTED Drill Steel

Will be found the cheapest and most satisfactory brand in the market. Unlike many American steels, every bar is Hammered, not Rolled, thus making it far superior both in TOUGHNESS AND DURABILITY.

SCHAW, INGRAM, BATCHER & CO., SACRAMENTO—SAN FRANCISCO.

HARPER & REYNOLDS CO., LOS ANGELES.

FIRTH'S DRILL STEEL.

USE THE BEST.

Has no equal in Hard Rock Drilling.

ABNER DOBLE COMPANY, GEN. AGTS.,
FREMONT AND HOWARD STS., SAN FRANCISCO.

Sold by Seattle Hardware Co., Seattle, Wash.

FOR SALE.

C E ENGINEERS PURCHASING & FORWARDING AGENTS B Co.

Six FIVE FOOT Huntington Mills

TOGETHER WITH NECESSARY

CRUSHING AND POWER PLANT.

Will Be Sold as Separate Items or Entire Mill.

PRESENT LOCATION: NEAR DEADWOOD, SOUTH DAKOTA.

Used Less Than Three Months. Guaranteed in Splendid Condition.

WILL NAME PRICES F. O. B. DEADWOOD, CHICAGO, OR DELIVERED AS DESIRED.

SPECIFICATIONS (Condensed).

6 ORE GATES, 24 x 38, rack, hand wheel, frames, bolts, complete.
2 ORE BINS, all necessary bolts, rods, nuts and washers.
2 GRIZZLEYS, 4′ x 10′, 1″ openings.
6 CHALLENGE AUTOMATIC ORE FEEDERS, including hoppers, wood frame, shafts and pulleys.
6 HUNTINGTON CENTRIFUGAL ROLLER MILLS, 5′ diameter, all fixtures and fittings, complete with wooden frame, shafts, pulleys and gearing.
6 COPPER TABLES, 6′ x 12′, ⅛″ copper, electroplated 1 oz. of silver per square foot.
2 AMALGAM SAFES.
1 BELT TIGHTENER, complete with pulley, boxes, etc., for main belt.
1 BELT TIGHTENER, complete with pulley, boxes, etc., for crusher.
1 CORLISS ENGINE, built by Fraser & Chalmers, cylinder 20″ diameter by 48″ stroke, complete in every particular, shaft 10″ in diameter, band flywheel 16′ diameter, 30″ face; weight, 42,000 pounds.
3 HORIZONTAL TUBULAR BOILERS, 54″ diameter, 16′ long, complete with steam drums 30″ x 72″, mud drums 18″ x 66″ for each boiler, breechings, smoke box, stack 48″ diameter 60′ long, all necessary guy rope, half arch fronts, grate bars, cast and wrought iron parts necessary for setting, feed, blow off check and safety valves, gauges and all fittings. Weight, 51,000 lbs. At present these boilers are arranged for setting in one battery. We will make any changes required, furnishing stacks and other items necessary to set each boiler separately.
1 HEATER, tubular, 30″ diameter, complete, with exhaust pipe.
2 NO. 5 KNOWLES BOILER FEED PUMPS.
1 BERRYMAN HEATER, 18″ diameter by 7′ long, copper tubes, 4″ pipe inlet and outlet.
1 HOOKER VERTICAL SINKING PUMP, 14x8x14, 6″ suction 5″ discharge.
8 ORE CARS, one ton capacity each.
1 WATER WHEEL, 50 H. P.
1 16″ BULLION FURNACE, complete, including 10″ Gold Retort, stack and all iron work.
1 NO. 5 STYLE B GATES FINE CRUSHER.
1 LOT REPAIR PARTS FOR HUNTINGTON MILLS, including roller shells, ring dies, scraper bars, shoes, screens, clamping plates, all new, never used.
1 LARGE LOT OF PIPE AND FITTINGS.
1 LOT BOLTS, WASHERS, RIVETS AND NUTS.
1 LOT OF MISCELLANEOUS SHAFTING, PULLEYS, PILLOW BLOCKS, HANGERS, ETC.
120′ RUBBER BELTING, 28″, 6-ply.
58′ RUBBER BELTING, 18″, 4-ply.
150′ RUBBER BELTING, 16″, 4-ply.
70′ RUBBER BELTING, 14″, 4-ply.
2 LOCOMOTIVES, 20″ gauge, built by H. K. Porter Co., Pittsburgh, one 6x10 cylinders, the other 8x14 cylinders, both saddle tank.

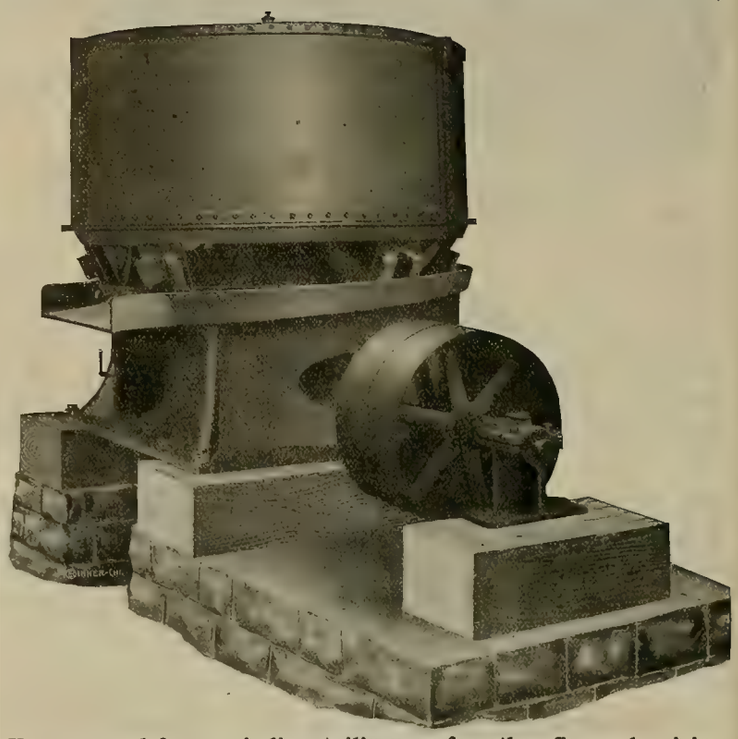
FOR FULL INFORMATION AND PRICES, APPLY TO : : :

CHAS. E. BILLIN & CO.,
1543 Marquette Building,
All Offers Subject to Previous Sale. **CHICAGO, ILL.**

GATES IRON WORKS,

SOLE MANUFACTURERS OF THE

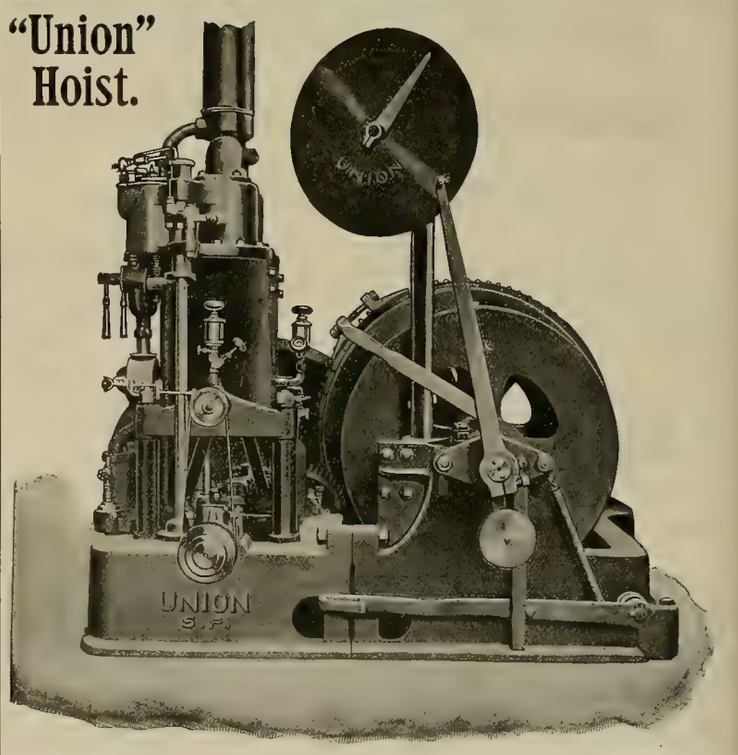
BRADLEY CHILIAN MILL,



Unsurpassed for regrinding tailings or for other fine pulverizing.
ALL KINDS OF HIGH GRADE MINING MACHINERY.

650 Elston Ave., CHICAGO.

"Union" Hoist.



The above illustrates the 25 H. P. double cylinder, single drum "Union" hoist, with all the latest improvements.

THE UNION GAS ENGINE CO.

—BUILD THE—

"Union" Gas Engines,

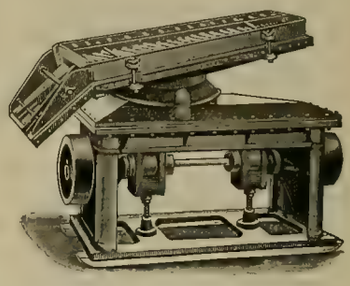
Which use either MANUFACTURED or NATURAL GAS, ORDINARY STOVE GASOLINE (NAPHTHA or BENZINE), DISTILLATE or KEROSENE.

STATIONARY ENGINES for All Kinds of Work in Sizes from 3 to 300 h. p. in actual use.
"UNION" COMBINED HOISTS in Sizes from 2 to 130 h. p. in actual use.
"UNION" COMBINED COMPRESSORS—20, 30, 40 h. p.
HOISTS and COMPRESSORS Can Be Built in Larger Sizes to Order.
"UNION" MARINE ENGINES, 4 to 300 h. p., of Single, Double and Four-Cylinder Types.
FIFTEEN YEARS' EXPERIENCE Building Gas and Oil Engines.
"UNION" ENGINES Are In Use All Over the United States.
"UNION" ENGINES Are Simple, Durable and Economical.

Office, 248 First Street. Works, Corner First and Clementina Streets. SAN FRANCISCO, CAL.

IN COMPETITION WITH THE ENTIRE WORLD.
THE ONLY
GOLD MEDAL
GIVEN AT THE
PARIS EXPOSITION, 1900
FOR EXHIBITS OF
VALVES AND FITTINGS
WAS AWARDED TO
CRANE CO.
NEW YORK
PHILADELPHIA
CINCINNATI
KANSAS CITY
SIOUX CITY
OMAHA
ST. PAUL
ST. LOUIS
LOS ANGELES
SAN FRANCISCO
PORTLAND, ORE.
CHICAGO
ESTABLISHED 1855
WRITE FOR POCKET CATALOGUE

TREAT YOUR ORES,
SAVE YOUR VALUES,
CONCENTRATE
AND : : :
AMALGAMATE
In substance at one operation by the
Hooper Pneumatic System.



Floor Space, 3x6 Ft. Weight, 2250 Lbs.
Capacity, 10 to 50 Tons Daily.

WE USE NEITHER
WATER, CHEMICALS NOR QUICKSILVER.

Ores, etc., Treated:

Gold,	Copper,	Corundum,
Lead,	Chrome,	Antimony,
Zinc,	Nickel,	Cinnabar,
Mica,	Clays,	Black Sands,
Tin,	Garnet,	Any Sands,
Slags,	Graphite,	Mixed Ores,
Silver,	Fluor Spar,	Metallic Ores.

SAMPLE LOTS TREATED FREE.
WRITE FOR SHIPPING TAGS.

WHAT THEY SAY:

Capt. C. S. Collins, 58 Broad St., N. Y., says: "It's the best GOLD saver in the world."

Capt. H. R. Gillingham, Cld., N. C., says: "Saves the minutest float Gold, and after two years' use am convinced it is the only machine that will save float Gold."

Sam Keast, Supt. Buster mine, A. T., says. "Will do perfect work and save all the Gold, fine or coarse, with proper usage. We save Gold readily that floats on water."

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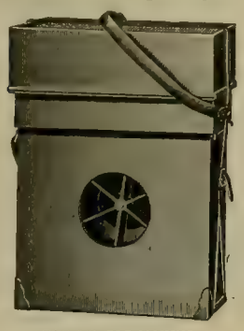

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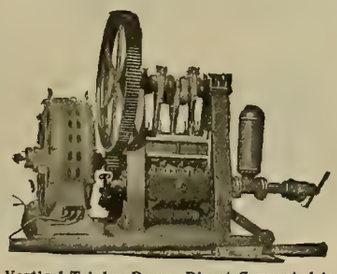

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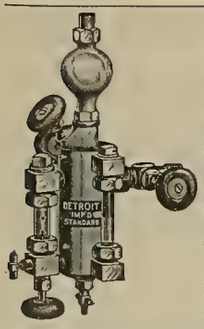

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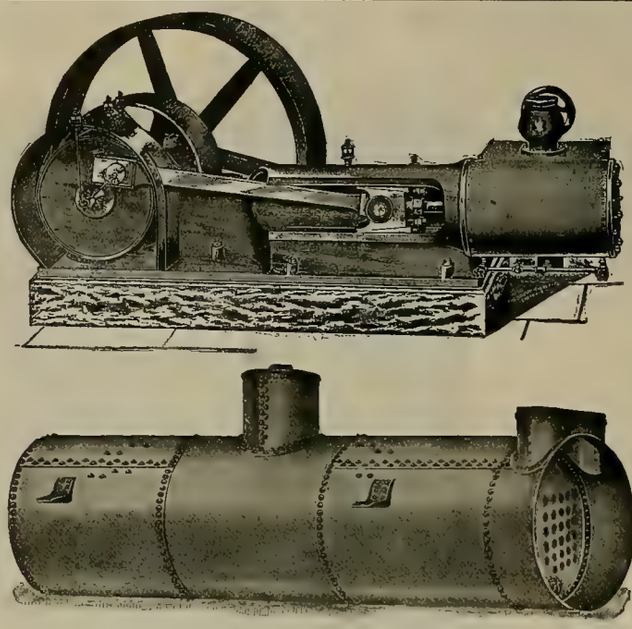

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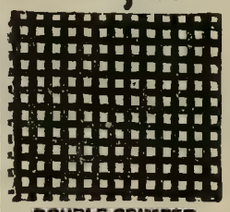

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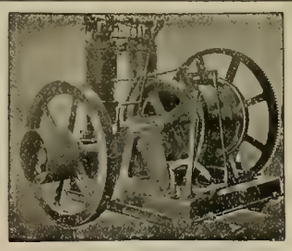

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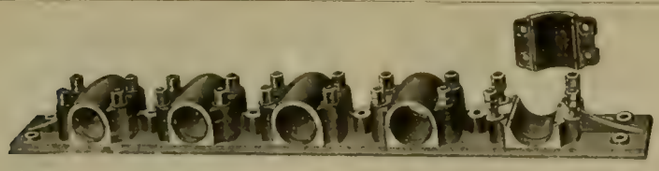

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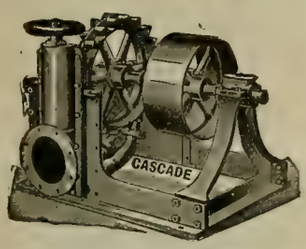

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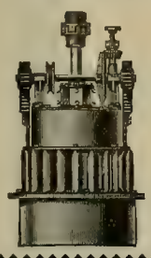

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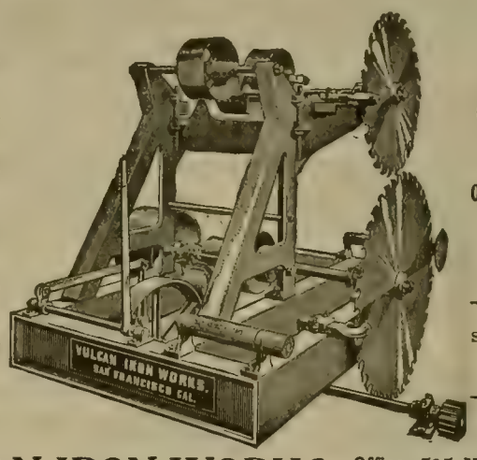

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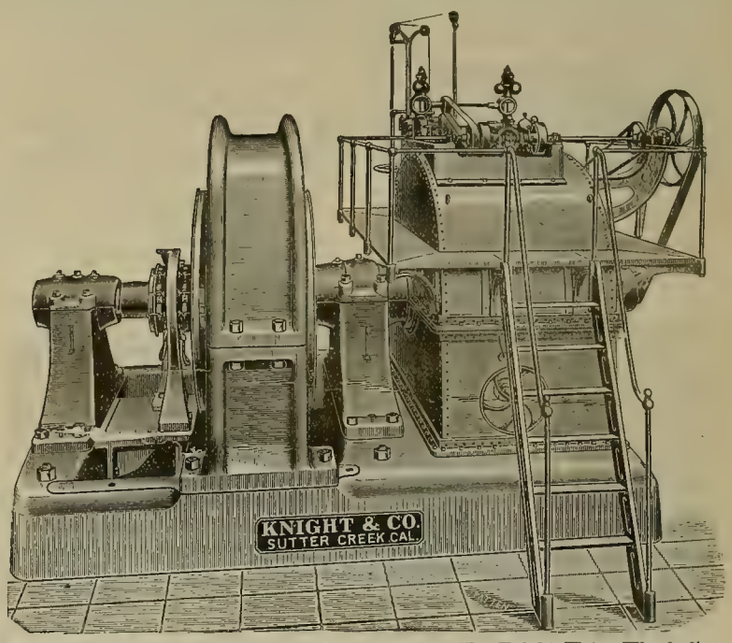

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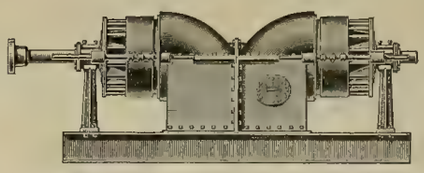

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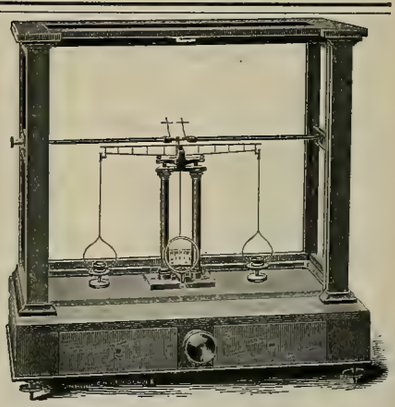

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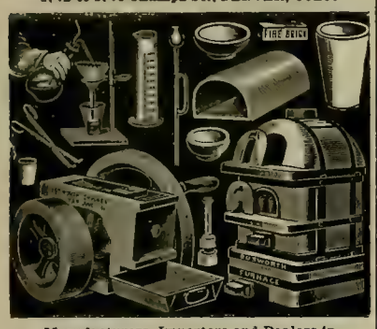

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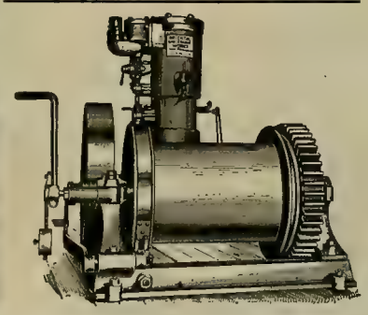

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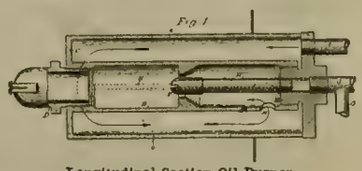

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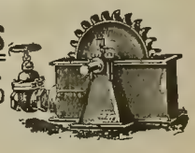

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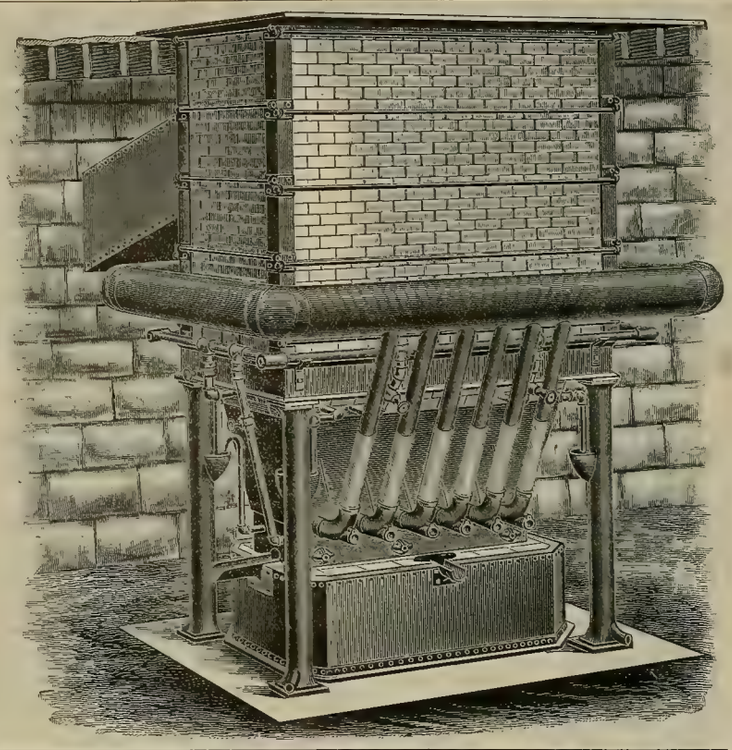

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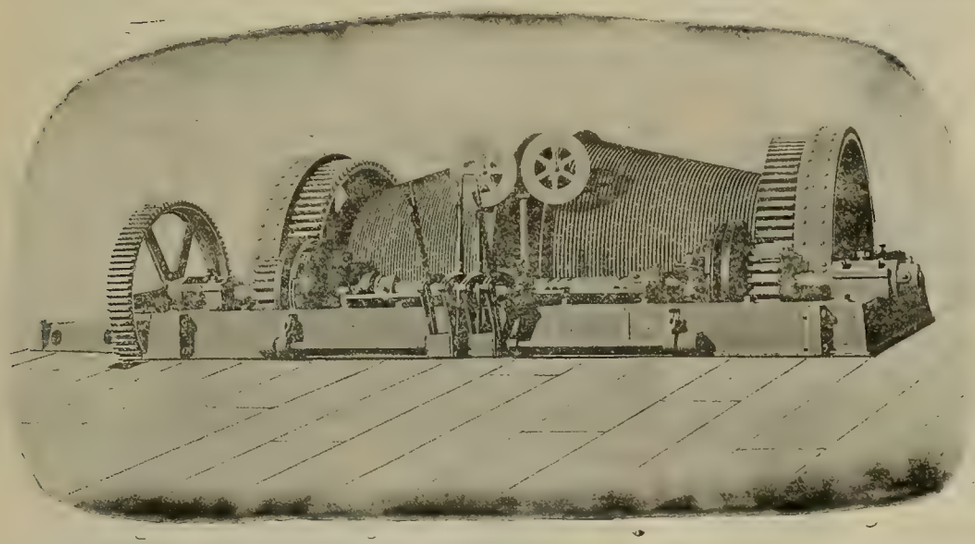

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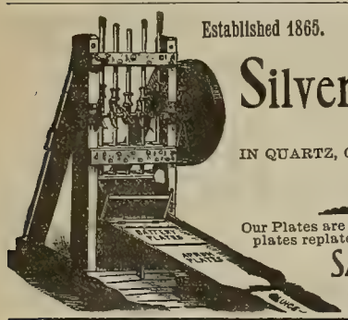

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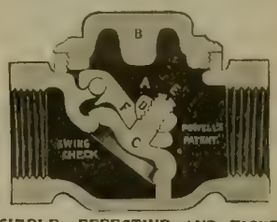

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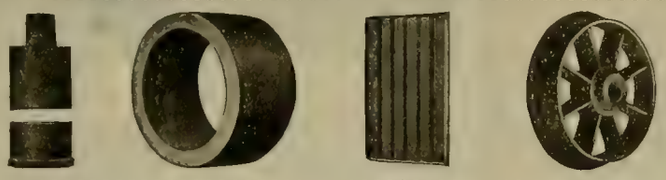

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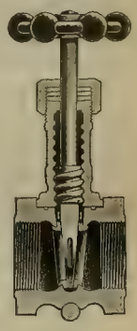

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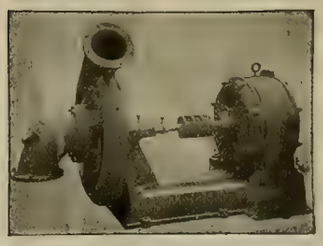

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Notice is hereby given, that at a meeting of the Board of Directors, held on the 24th day of December, 1900, an assessment (No. 20) of Ten ($10) Dollars per share was levied upon the capital stock of the corporation, payable immediately in United States gold coin, to the secretary, at the office of the company, 320 Sansome street, room 24, San Francisco, California.

Any stock upon which this assessment shall remain unpaid on the 11th day of February, 1901, will be delinquent, and advertised for sale at public auction; and unless payment is made before, will be sold on SATURDAY, the 2nd day of March, 1901, to pay the delinquent assessment, together with the costs of advertising and expenses of sale.

By order of the Board of Directors.

JOSEPH H. MOOSER, Secretary.

Office—320 Sansome street, room 24, San Francisco, California.

SILVER KING MINING COMPANY.—Location of principal place of business, San Francisco, California; location of works, Pioneer Mining District Pinal County, Arizona Territory.

Notice is hereby given, that at a meeting of the Board of Directors, held on the 13th day of December, 1900, an assessment (No. 22) of twenty-five (25) cents per share was levied upon the capital stock of the corporation, payable immediately in United States gold coin, to the secretary, at the office of the company, No. 310 Pine street, Room 36, San Francisco, California.

Any stock upon which this assessment shall remain unpaid on the 22d day of January, 1901, will be delinquent, and advertised for sale at public auction; and unless payment is made before, will be sold on TUESDAY, the 19th day of February, 1901, to pay the delinquent assessment, together with the costs of advertising and expenses of sale.

By order of the Board of Directors.

J. W. PEW, Secretary.

Office—310 Pine street, Room 36, San Francisco, California.

TANANA MINING COMPANY.—Location of principal place of business, San Francisco, California.

Notice is hereby given, that at a meeting of the Board of Directors, held on the 20th day of December, A. D. 1900, an assessment (No. 2) of ten cents per share was levied upon the capital stock of the corporation, payable immediately in United States gold coin to the secretary, Edward H. Stearns, at his office, Room 801 Claus Spreckels Building, Cor. Third and Market Sts., San Francisco, California.

Any stock upon which this assessment shall remain unpaid on the 13th day of February, 1901, will be delinquent and advertised for sale at public auction; and unless payment is made before, will be sold on WEDNESDAY, the 6th day of March, 1901, to pay the delinquent assessment, together with the costs of advertising and expenses of sale.

By order of the Board of Directors.

EDWARD H. STEARNS, Secretary.

Office—Room 801 Claus Spreckels Building, Cor. Third and Market Sts., San Francisco, California.

YUBA RIVER GOLD DREDGING COMPANY.—Location of principal place of business, San Francisco, California; location of works, Smartsville, Yuba County, California.

Notice is hereby given, that at a meeting of the Board of Directors, held on the 4th day of January, 1901, an assessment (No. 2) of three cents (3 cents) per share was levied upon the capital stock of the corporation, payable immediately in United States gold coin, to the secretary, at the office of the company, No. 214 Pine street, Room 29, San Francisco, California.

Any stock upon which this assessment shall remain unpaid on the 9th day of February, 1901, will be delinquent, and advertised for sale at public auction; and unless payment is made before, will be sold on TUESDAY, the 5th day of March, 1901, to pay the delinquent assessment, together with the costs of advertising and expenses of sale.

By order of the Board of Directors.

ALBERT CERF, Secretary.

Office—No. 214 Pine street, Room 29, San Francisco, California.

The Florence AND Cripple Creek Railroad Company.

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DELINQUENT SALE NOTICE.

AMERICAN OIL AND REFINERY COMPANY.—Location of principal place of business, San Francisco, California. Location of works, Contra Costa County, California.

NOTICE.—There are delinquent upon the following described stock, on account of assessment (No. 2) levied on the 26th day of November, 1900 the several amounts set opposite the names of the respective shareholders, as follows:

Names.	No. Cert.	No. Shares.	Amt.
Abbott, William	720	50	2 50
Abbott, William	721	50	2 50
Abbott, William	722	50	2 50
Abbott, William	723	25	1 25
Abbott William	734	25	1 25
Anthony, J. C., Trustee	797	1,000	50 00
Anthony, J. C., Trustee	798	1,000	50 00
Anthony, J. C., Trustee	799	1,000	50 00
Anthony, J. C., Trustee	973	1,000	50 00
Anthony, J. C., Trustee	1021	4 300	215 00
Dignan, J. P.	1039	1,000	50 00
French, Mrs. Mary L.	385	2	10
Goodenough, S.	1046	380	19 00
Holbrook, W. E., Trustee	897	10.000	500 00
Holbrook, W. E., Trustee	898	11,000	550 00
Holbrook, W. E., Trustee	899	4 500	225 00
Holbrook, W. E., Trustee	900	4,500	225 00
Kielhofer, Mrs. Louis	298	2	10
Kraehmer, Louis L.	471	3	15
Laird, Mrs. L. N.	230	5	25
Lord, Mrs. Leona E.	327	2.000	100 00
Lucas, Mrs. T. R.	848	10	50
Mayer, Mrs. L.	406	800	40 00
Massey, James B.	914	1	05
McKelvey, Mrs Angelina	71	12	60
McAllister, H. L.	1071	100	5 00
Pope, Wm	656	50	2 50
Pope, Wm	695	20	1 00
Pope, Wm	764	30	1 50
Pope, Wm	908	20	1 00
Raht, Julia F.	321	25	1 25
Raht, Julia F.	453	40	2 00
Rachel, Mrs. Eliza	856	400	20 00
Royce, Lizzie A.	441	5	25
Russell, G. E.	125	3	15
Stover, W. M.	1047	480	24 00
Truitt, J. J.	399	5	25
Walser, Mark	858	1,000	50 00
Walser, Mark	859	1,000	50 00
Walser, Mark	860	1,000	50 00
Walser, Mark	861	1,000	50 00
Walser, Mark	863	500	25 00
Walser, Mark	867	500	25 00
Walser, Mark	868	500	25 00
Walser, Mark	869	500	25 00
Walser, Mark	870	500	25 00
Walser, Mark	871	500	25 00
Walser, Mark	872	500	25 00
Walser, Mark	921	50	2 50
Walser, Mark	926	5,000	250 00
Walser, Mark	927	5,000	250 00
Walser, Mark, Trustee	596	500	25 00
Walker, Mrs. S. E. D. E.	375	120	6 00
Young, R.	761	328	16 40

And in accordance with law, and an order from the Board of Directors, made on the 26th day of November, 1900, so many shares of each parcel of such stock as may be necessary, will be sold at public auction at the office of said corporation, in Rooms 322-323 Parrott building, San Francisco, California, on MONDAY, the 28th day of January, 1901, at the hour of 1 o'clock P. M. of said day, to pay said delinquent assessment thereon, together with costs of advertising and expenses of sale.

J. C. ANTHONY, Secretary.

Office—Rooms 322-323, Parrott building, San Francisco, California.

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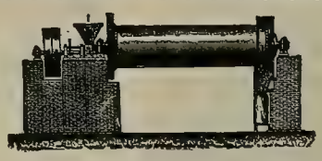

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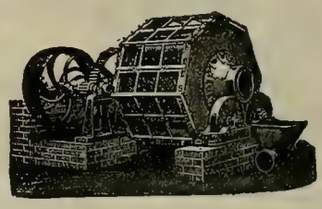

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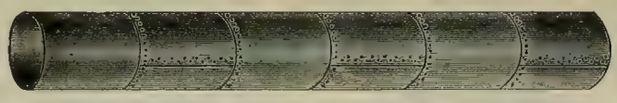

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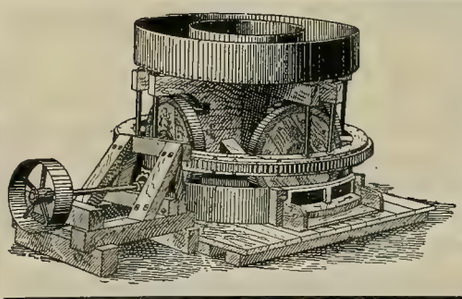

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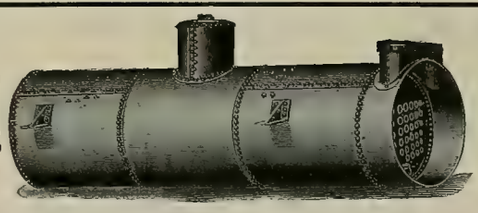

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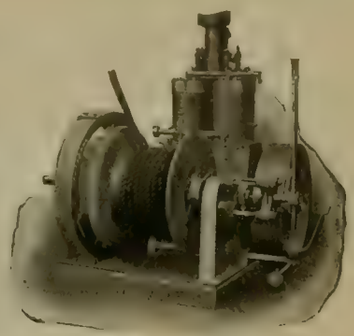

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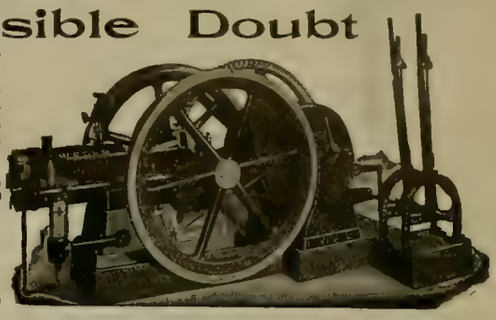

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NOTICE OF AMENDMENT OF ARTICLES OF INCORPORATION.

Notice is hereby given that it is the intention of the JAMISON MINING COMPANY to amend its Articles of Incorporation by substituting for the second of said articles setting forth the purposes of the Corporation, which now reads:

"2nd. That the purposes for which it is formed are: The acquisition of quartz mines and gravel mines in the State of California, and to work the same for gold and silver; also, to acquire, hold and use water and water-rights and privileges in connection with such mining; also, to acquire, hold and use timber lands in connection with such mining," the following:

Second:—That the purposes for which it is formed are: To mine for, and mill and reduce ores of all kinds; to acquire by location, purchase or otherwise, to own, hold, work and operate mines in and throughout the State of California; to acquire by purchase or otherwise, to own, hold, develop, improve, lease, let, mortgage, grant, bargain, sell and convey mines, and mining claims and properties in the State of California; to acquire, by purchase or otherwise, to build, erect, construct, own, operate, lease, let, mortgage, grant, bargain, sell and convey mills, and other reduction and smelting works, for the milling and reduction and smelting of ores, and to deal in precious metals and minerals and the products of mines of every kind, and to transport and provide ways and means to transport the same to market, and to market and sell the same; to acquire, by purchase or otherwise, to improve, develop, own, hold, use, lease, let, mortgage, grant, bargain, sell and convey real property, lands, water, water-rights, privileges, and franchises of every kind, in and throughout the State of California; to buy, own, hold, sell and generally deal in goods, wares and merchandise, and all kinds of personal property, including the stocks of other corporations, also bonds, notes and personal securities of every kind. To establish and maintain agencies of said Corporation, and to appoint and employ agents, wherever it may be deemed best by said Company; and generally to do any and everything necessary, proper or expedient to carry out the aforesaid purposes and carry on the business of said Corporation.

NOTICE OF STOCKHOLDERS' MEETING.

A Special Meeting of the Stockholders of the JAMISON MINING COMPANY for the purpose of considering and acting upon the matter of Amending its Articles of Incorporation, as above provided, will be held at the office of the company, room 54, 120 Sutter street, San Francisco, California, at two o'clock P. M. on Monday, the 11th day of February, 1901.

By order of the Board at its meeting of December 31st, 1900. SAM W. CHEYNEY,
Secretary Jamison Mining Company.

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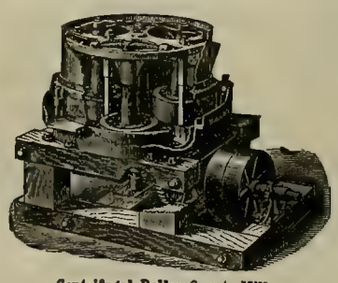

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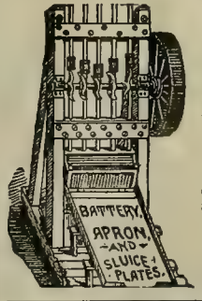

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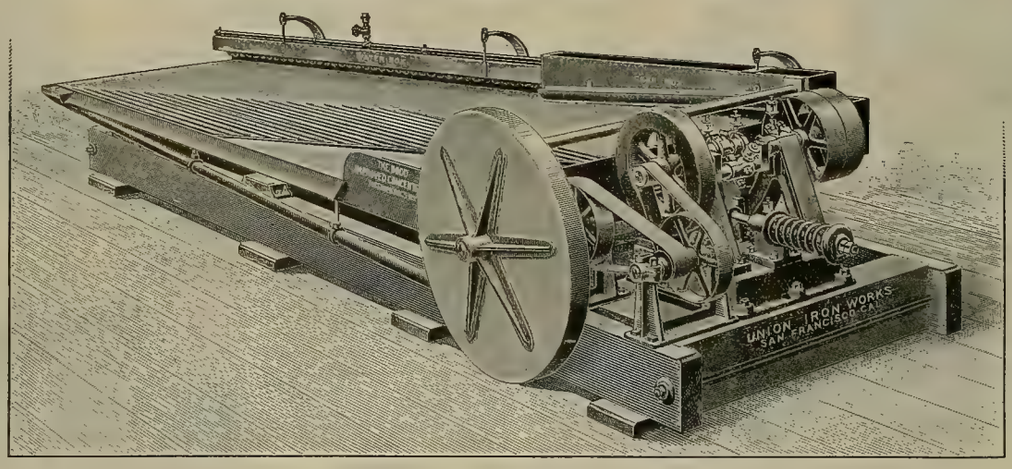

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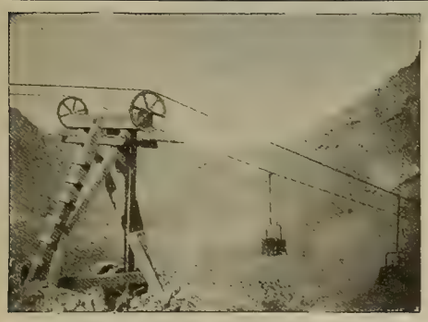

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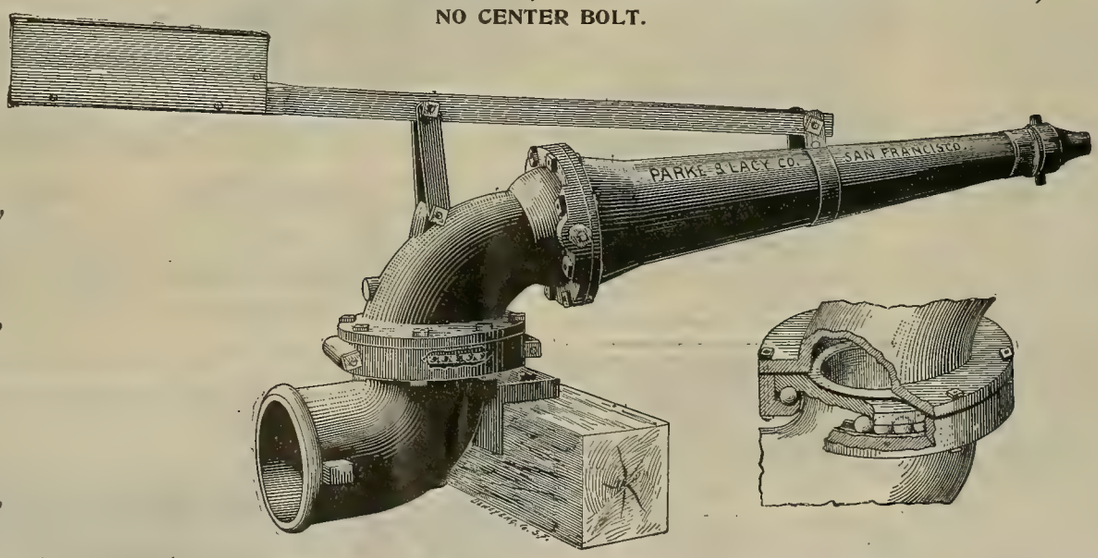

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Whole No. 2114.—VOLUME LXXXII. Number 4. SAN FRANCISCO, SATURDAY, JANUARY 26, 1901. THREE DOLLARS PER ANNUM. Single Copies, Ten Cents.

Some Views of the Wreck of the Lighting Plant of the Chicago & Northwestern Railway Co., Chicago, Ill., Caused by a Boiler Explosion on the 3d Ult. (See page 61.)

MINING AND SCIENTIFIC PRESS.

ESTABLISHED 1860.

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W. D. CURTIS.....223 W. Second St., Los Angeles, Cal.

San Francisco, January 26, 1901.

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IN the annual report of a British Columbia mining company—the Centre Star of Rossland—in the items of expenses for the year is this: "Extralateral litigation, $30,953.22." This "extralateral" business comes high. Still, there are miners who "can't see why there should be any change in the apex law."

THE American Smelting & Refining Co. proposes to increase its capital stock to $100,000,000. Including the recently absorbed Guggenheim interests, its properties embrace the smelting, refining and electrolytic copper plants at Perth Amboy, N. J.; Pueblo and Leadville, Colo.; Salt Lake City, Utah; Agua Caliente and Monterey, Mexico; one establishment in South America; and lead contracts in each of the three countries mentioned. The aggregate cash and working capital payment to be made by the Guggenheims is $6,000,000 and $9,000,000, respectively. The latter's property is figured at $35,000,000, which would allow $20,000,000 for plants and good-will.

THIS paper is apprised that the British South Africa Co., which in some way claims ownership to a part of Africa, has "granted" a little corner thereof, "approximately 10,000 square miles," to "the North Charterland Exploration Co., Limited," and that the latter corporation, having full dominion and power therein and thereby, is graciously pleased to permit prospectors to enter therein. Further information is vouchsafed to the effect that the last named corporation will pay £20,000 "to any person or persons first discovering a payable gold reef or alluvial gold field in its territory," which, taking everything into consideration, would seem to be a good proposition—for the company.

THE superior acumen of the Chicago lawyer has again been asserted. Chicago papers have a story of a mining litigation in which the questions of the genesis of ore deposits and the economical extraction of ore were prominent. The counsel for the defendant was suddenly stricken, and an "eminent Chicago lawyer" summoned. Though he had "never been engaged in a mining case before, and knew nothing whatever about mining," he took the case at twelve hours' notice, and "in one night's study mastered every detail of ore deposits and the successful treatment of gold ores." This is, indeed, marvelous, or would be for any one other than a Chicago lawyer. A giant redwood should be plucked from the Sierra foothills, its branches dipped in the crater of the world's most active volcano and the statement outlined in letters of livid light on the upcast firmament. That is, if the assertion be correct. Its accuracy will, however, be questioned by 10,000 scientific miners and metallurgists who have labored unsuccessfully for years to partially achieve the alleged results obtained by the Chicago lawyer in a single night.

Bubble "Mining Investments."

And now it is the "Arizona & Montana Development Co." that is being declared a swindle by some of its victimized shareholders, who assert that the promoters and associates have imposed on their confidence to the extent of about one million dollars "treasury stock," sold to them at $5 per share on a promise of a 2% per month dividend. Five of these dividends were paid; of course, from money realized from the sale of the stock. It is the old story and one that probably will continue during the twentieth century as it did during the nineteenth and all the other centuries. We have little sympathy for those gullible bank presidents and others who bought stock in the high-sounding corporation, and who have lost their money. Doubtless each one of them congratulated himself upon his shrewdness in getting a stock that promised to prove so handsome an investment. This adds but one more to the hundreds of similar schemes which so seriously injure the real business of mining investments. There is no more mining investment about a fraud of that kind than there is legitimate business about a race track wager. Indeed, as between the two, the man who bets on a horse race has a better chance of getting his money back. Equally doubtless, as usual, every one who invested in that corporation scheme is forsworn forever against "mining investments," fancying that that is a sample of what a mining investment always turns out to be. The discredit and disgrace inevitably attached to such a concern should not in any way be charged against the district selected by the swindlers as their field of operations, though, unfortunately, every one losing in the latest fiasco will always have a bad word for that section in connection therewith.

It is characteristic of any State or Territory where profitable mining is being carried on to be cursed by several sets of swindlers who make use of the very prosperity of that mining section to float their fraudulent schemes. There are other similar swindling enterprises that are fleecing foolish and ignorant investors out of their money. They are rarely heard of in this west half of America where real mining goes on; their favorite stamping ground is east of the Missouri river. Most of them have some claim to some obscure mining property, and with a glittering prospectus, in which appears prominently an exact statement of the record of some rich mining property in that district and a flattering report from some self-constituted "expert," their agents wheedle money out of the pockets of men who know no more about mining than mining does about them. Usually they begin to investigate after they have "invested."

It is difficult for a mining journal to follow those fellows and still more difficult when found to prove the fraud, and, ofttimes, when that last is done it is a thankless task. The very ones who ask information or seek protection sometimes turn on their honest informant and attempt to shield those who have swindled them. Of course, the bursting of such bubbles as the Arizona & Montana Development Co. should have no effect on legitimate mining investments, but, unfortunately, it is just those things that tend to keep alive the mistaken notion in many people's heads regarding the whole subject of mining investments, forgetting that as in all other profitable and legitimate business industries there are imitators, on the same principle that it is only good money that is counterfeited.

Glimpses of the inside history of some of these swindling mining concerns would furnish interesting reading. It is not infrequently the case that a mining journal, in its zeal to serve the interests of those who naturally look to it for protective information, exposes a swindle, but without immediately accessible direct proof of the fraud, and is at once made the subject of a costly and vexatious libel suit purely for advertising purposes. Indeed the very exposure that would and should ordinarily down a set of tricksters is sometimes used by those fellows as a further means of fraud, by heralding the statement that "slanderous and injurious statements have been made, but prompt vindication from the malicious libel upon our solvency and integrity will be promptly forthcoming," and the journal making the accusations harassed by shysters of the same class and kidney, who glory in a notice of any kind and make capital of any mention, garbling the language and making condemnation appear as commendation.

REGARDING the statement in last week's issue concerning the free importation of mining machinery into Russia, the facts in detail are that, under an order of the Russian Government, dated Sept. 8, 1898, may be imported free of duty, during a period of ten years, across all frontiers of the Russian empire, for the requirements of Siberian and Ural gold mining, the following: Flash wheels, spouts and water pipes with appurtenances, distributors, and other apparatus for hydraulic placer or surface working; hydraulic elevators for raising gold-bearing sands and deposits; concentrators of all systems for working gold-bearing sands; concentrating appliances for the reduction of slimes and the extraction therefrom of slick and pyrites; apparatus for amalgamating gold-bearing ores, including amalgamators of every description, mills, pans, metallic sheets and other apparatus destined for the extraction of gold by means of amalgamation; apparatus for the extraction of gold by wet process—smelting rotating furnaces of every kind—and other apparatus for chlorinization, viz.: generators for obtaining chlorine, cylindrical plans of boiler and half-boiler iron, and all appurtenances belonging to them, and serving for the extraction of gold by means of cyanide of potassium and other chemical reactors, as also dynamo machines for electrical deposits of gold from cyanide solutions; likewise dredgers and earth-suction machines complete, excavators, diamond drilling machines complete, and perforators of all systems, borers and iron tubes for the same, worked by hand, condensed air or electricity; portable railways, rails, rolling stock for them and wire cables for suspended railways, as also rolling stock for same; pumps of every description, upright, forcing and centrifugal, pulsometers; ventilators of every description; crushing apparatus, pulverizers, stamps, cylindrical mills, runners, sorting apparatus, cylinders, screens sieves; graders, water motors, steam engines, steam boilers for same, electric motors.

THERE is a commendable promptness in Mexican mining law procedure that is in refreshing contrast to the vexatious and dilatory methods apparent in United States courts. In February, 1900, a San Francisco mining man, plaintiff in a case involving title to Mexican mining property, was notified that the trial would be before the local judge in Concordia, Sinaloa. The case was tried without delay; the plaintiff lost and appealed to the Supreme Court of the State of Sinaloa at Culican, in which tribunal the decision of the trial court was reversed. The defendant appealed to the Federal Court of the district, which affirmed the decree of the Supreme Court of the State. Defendant appealed to the Supreme Court of the City of Mexico. The hearing took place January 5th, that court affirming the judgment of the Federal Court of Sinaloa. This is a record of one Mexican mining case, in which four decisions were secured in eleven months, ranging from the lowest court to the final supreme tribunal. Mining litigants in this country would consider themselves doing well if they got such result in eleven years.

THE advance in technical literature is fittingly characterized at the opening of the century by the appearance of a "historical number" of the Electrical Review, of New York City, an admirable compendium of electrical history and technical information, in the issue of January 12th, which comprises 192 pages. The January issue of the Engineering Magazine of New York is another publication deserving mention. Its 340 pages of finely produced material treat of present conditions and problems regarding equipment, organization and management, and is an inspiration to workers everywhere. Both publications are valuable for present use and future reference, and are monumental in their scope and effect. In each instance a great occasion was rightly utilized to the common benefit of progress.

Concentrates.

CASTOR OIL will keep leather belts soft.

THE deepest shaft in Victoria, Australia, is at Stawell, 2415 feet.

WITH 100 feet head, 50 inches water should give, theoretically, 12 H. P.; about 9¼ actual.

GAS does not form in a steam boiler while in use, unless superheated steam be called a "gas."

THE United States ton is 32,000 ounces of 437½ grains each; 2000 pounds troy would contain 11,520,000 troy grains.

STEAM rising from water at its boiling point, 212° F., has a pressure equal to the atmosphere—14.7 pounds to the square inch.

MINE DIVIDEND ANNOUNCEMENTS are published herein as news, without charge, when bona fide and authentically furnished.

THE revised import duty on cyanide of potassium is 12½% ad valorem; 98% cyanide is wholesaled at 28 cents per pound in New York City.

CHAS. F. CHANDLER of the School of Mines, Columbia University, New York City, devised and put into use the assay-ton system of weights.

IN boring an artesian well "solid rock" is technically understood to mean rock which will not cave when drilled, or yield or move under the drill.

THE production of quicksilver during 1899 amounted to 30,454 flasks ($1,452,745), against 31,092 flasks ($1,188,627) in 1898, showing a falling off of 638 flasks, but a rise in value of $264,118.

STEADY progress is made in the work of unwatering the Comstock, Nevada, mines. Ore assaying $4 per ton is now susceptible of profit. The deepest of the old workings is 3300 feet.

FOR a small affair like a 50 watt dynamo, one giving 5 amperes at 10 volts, or 10 amperes at 5 volts, would be more satisfactory than one giving 1 ampere at 50 volts or ½ ampere at 100 volts.

A HAMILTON-CORLISS condensing engine, diameter of cylinder 12 inches, stroke 42 inches, revolutions per minute 78, steam pressure eighty pounds gauge, would have ninety indicated horse power.

A SLUICE HEAD is 1 cubic foot per second, or 60 cubic feet per minute, about 3750 pounds, so that, theoretically, one sluice head or cubic foot of water per second, falling 8.8 feet, should develop 1 H. P.

IN January, 1881, Lake copper was 19⅜ cents per pound; in January, 1894, 10 cents; in June, 1894, 9 cents. In January, 1881, lead was 5 cents per pound; in January, 1894, 3⅛ cents; in June, 1894, 3⅜ cents, New York.

DISTANCE at which sounds may be heard through rock varies directly with the hardness of the rock and the firmness of the transverse joints. Hammering and drilling have been heard through 180 feet of rock in mines.

IN a big manufacturing establishment the drafting room should take precedence of the machine shop; should have more to say, and its decisions should be final, provided that there are therein designers as well as draftsmen.

A 10-BRAKE horse power gas engine will consume about 3,700 cubic feet air per hour. The exhaust would better be piped from the engine out of the mine. Under ordinarily intelligent management there should be no danger from fire.

WITH a hose 2½ inches diameter, 700 feet long, 60 pounds pressure per square inch at hydrant, nozzle at discharge point 1½ inches diameter, the hose straight and inside smooth, there would be a discharge of 138¼ gallons per minute.

IN electrolytic production of copper, brittleness in the product is occasioned by deposition with a weak current from a neutral solution, the copper containing cupreous oxides, if the current is not able to completely decompose the copper sulphate.

A MIXTURE of ten parts of white lead, three parts of black oxide of manganese and one part litharge will stop a small leak in a steam boiler in an emergency for a little while, but the leak itself is evidence of structural defect that needs radical treatment.

CHILE, PERU AND BOLIVIA ship copper, copper ore and copper matte, silver and gold and silver and gold ore to England and Germany for treatment and refining at a charge of from $20 to $35 per ton. American smelters have not yet attracted much of that business.

THE only proposed amendment to federal mining laws proposed so far at this session of Congress is one by Senator Stewart of Nevada, prohibiting the location of more than one placer claim on the same watershed and more than one quartz claim on the same lode or vein by one person.

IN a gas engine with diameter of piston 2 inches, stroke 2½ inches, clearance in cylinder equal to one-half the volume swept through by the piston, to give proper compression, the weight of the flywheel, if 15 inches in diameter, should be 113 pounds; if 20 inches, 63½ pounds.

MOLYBDENUM ORE should contain 60% tungstic acid to be marketable, and approximately free from sulphur and phosphorus. The demand is exceedingly limited, and unless under peculiarly favorable circumstances there is no extraordinary incentive to molybdenite development.

SULPHATE OF ALUMINA is not present in wash water from mechanical filters, unless it be contained in the filtered water used for washing the filters. Hydrate of alumina is the product resultant from the decomposition of sulphate of alumina by lime, and is present in the water and is the active coagulating agent.

WHEN an electric arc is established under water between metallic electrodes such as zinc, lead, platinum, gold or silver, these metals are reduced to an extremely fine powder, which remains in suspension a long time, passing through most filters and giving distinct tints to the liquid. Platinum does not settle for weeks.

A SIMPLE TEST for the purity of manila or sisal rope is as follows: Take some of the loose fiber and roll it into balls and burn them completely to ashes, and, if the rope is pure manila, the ash will be a dull grayish black. If the rope be made from sisal the ash will be a whitish gray, and if the rope is made from a combination of manila and sisal the ash will be of a mixed color.

THEORETICALLY, the power in the water flowing over a dam or fall is found by multiplying the quantity of water in cubic feet per second by the height of the fall in feet, and this product by .1136. To find the available horse power, multiply the theoretical horse power by the decimal representing the efficiency of the water wheel, which, if an overshot wheel or turbine, varies from 45% to 85%.

HIGH ECONOMY may be obtained with almost any type of boiler if it is properly proportioned, if the furnace is of a kind adapted to burn the fuel thoroughly, and if the gas passages are arranged so as to avoid short circuiting. The highest efficiency practically attainable with a properly designed furnace and boiler is about 75%; 55% is probably a fair average efficiency for all boilers in use.

ORE which has to be roasted before leaching does not require pulverizing to such fineness as if leached in the raw state; this applies to either cyaniding or chlorination. A modern chlorination plant is economically adapted to the treatment of large quantities of ore. At a mine with a small output, or where concentrates are to be treated, a cyanide plant of smaller dimensions might be productive of more satisfactory commercial results.

IN the report of the Bureau of Mines of Ontario, Canada, for 1900, J. W. Bain, in treating of the nickel deposits near Sudbury, gives the world's production of nickel for 1898 as being a total of 6116 metric tons, of which Ontario produced 40.8%, or 2503 tons. The remainder came from New Caledonia. Since 1894 Ontario has produced 13,139 metric tons of nickel. Mr. Bain says the Canadian ore averages about 2.51% nickel and 2.92% copper.

MONTANA by legislation defines the status of the miners' inch as follows: A cubic foot of water (7.48 gallons) per second of time shall be the legal standard for the measurement of water. Where water rights expressed in miners' inches have been granted, 100 miners' inches shall be considered equivalent to a flow of 2½ cubic feet (18.7 gallons per second); 200 miners' inches shall be considered equivalent to a flow of 5 cubic feet (37.4 gallons) per second, and this proportion shall be observed in determining the equivalent flow represented by any number of miners' inches.

THERE are several compositions for lining crucibles. One produced by Wm. A. McAdams of New York is said to be of more than ordinary value. One part oxide of copper and four parts oxide of manganese, after mixing, are made into a paste with water, and plastered to a depth of three-sixteenths of an inch upon the inner wall of the crucible. It is first necessary, however, to fuse the oxide of manganese in a temperature of about 2000° C., subsequently reducing it to a fine powder. After the lining has been plastered on as stated, the crucible is dried and baked, the latter process partially fusing the oxide of copper, thus forming a binder between the manganese particles.

THE cost of a diamond drill plant to bore 1200 feet would probably be about $5000; the cost of working should be under $4 per foot. According to statistics from various parts of the United States, the cost of boring twelve holes from 200 to 800 feet in length each, totaling 5957 feet, is $14,839.62, or $2.49 per foot. This includes labor, superintendence, bits, repairs, water, extras, freight, travelling and carbons. In northern Michigan, two holes totaling 634 feet, two 360, six 1350, two 611, six 1091, or eighteen holes totaling 5048 feet, cost $2.60 per foot in very hard ground. In Colorado, 567 feet were bored at 44 cents per foot. The cost depends a good deal on the length of standpipe used and other local differences.

IN California the owner of land under which a stream flows can maintain an action for the diversion of it, if such diversion takes place under the same circumstances as would enable him to recover if the stream had been wholly above ground. But for this purpose the underground water must flow in known and well defined channels, so as to constitute regular and constant streams, in order that the riparian owner or appropriator may invoke the same rules as are applied to the surface streams, or otherwise the presumption will be that they have their sources in the ordinary percolation through the soil. Subterranean waters whose channels are unknown and undefined are classed with percolating waters. The point to be specially noted here is the meaning ascribed to the words "defined" and "known." "Defined" means a contracted and bounded channel, though the course of the stream may be undefined by human knowledge; the word "known" refers to knowledge of the course of streams by reasonable inference.

AMONG the chief considerations in a mortar are its width, measured at the discharge lip, and its depth from that line. The latter can be largely modified by clinch blocks, but the width is relatively a fixed quantity. Greater width reduces scour on inside amalgamating plates, and lowers crushing capacity, lessening the discharge of relatively coarse material, increasing the amalgamating power of the mill, largely because of the improved efficiency of the inside plates. To secure maximum amount of amalgamation inside the battery a relatively wide mortar is recommended, and a shallow, rather than a deep mortar as depth ordinarily favors fine crushing and high amalgamation at the expense of capacity.

BLUESTONE is recovered from the discarded electrolyte in copper smelters and refineries by first boiling the solution in lead-lined tanks with scrap copper, in the presence of steam and air, to neutralize the free acid and increase the copper contents of the solution to the desired degree. It is then pumped up to the crystallizing tanks, in which the bluestone is secured by allowing the copper sulphate to crystallize out on bands of lead suspended in the saturated solution. The mother-liquor siphoned off contains most of the arsenic and antimony originally present in the electrolyte, together with some remaining copper. To recover the latter the mother-liquor is treated in special tanks with sheets of scrap iron. This metal first precipitates out the copper and then the arsenic, a black precipitate being finally secured containing as high as 60% metallic arsenic.

POSTS from 5 to 7 inches in diameter, firmly planted in the ground at the corners and ends of a mining claim, and standing not less than 5 feet above ground, are permanent monuments within the meaning of the Revised Statutes, Section 7324, requiring all records of such claims to contain a description of the claim by reference to some natural object or permanent monument as will identify the claim, and a recorded notice, which, in addition to a reference to such posts, also gives the general direction and distance of the claim from a lake or a river, is a sufficient compliance with the statute. Where there is a conflict of evidence as to which one of two posts is the one set by the locator of a mining claim to mark one of the corners, one of which would exclude and one include the discovery on which the location was based, and the work done by the locator and the official survey for a patent was based on the latter on information by the locator who set the posts, the testimony in favor of that as the true corner which sustains the survey and the validity of the location will be perfected.

REGARDING the bore hole 6571 feet below the surface of the soil, made at Parnschowitz, near Rybrick, Upper Silesia, the hole was 12 inches in diameter at the beginning; this was lined with a tube about 0.4 inch thick; at a depth of 230 feet the bore was reduced to 8½ inches diameter, and thus continued for 351 feet. At this point the blue marl encountered became so compact that a diamond drill had to be used, and under the action of the water the marl swelled to such a degree that the diameter of the pipe had to be again reduced. The greatest difficulty encountered was the great weight of the boring rods, as the depth increased. Though steel was used, at a depth of 6560 feet the total weight of the tools reached 30,155 pounds. Under this weight ruptures of the rods were frequent, and an accident of this nature finally stopped the work; about 4500 feet of rods fell to the bottom, and, being jammed under a part of the tubing, it was impossible to withdraw it. The diameter of the well at the bottom was 2¾ inches. Temperature observations made showed 12° C., or 53.6° F., at the surface, and at the depth of 6571 feet the temperature reached 69.3° C., or 157° F., equivalent to an average augmentation of heat of 1° C. for every 34.14 m. of depth.

THE Revised Statutes of the United States—Section 2320—limit a lode claim of mineral-bearing quartz to 300 feet on each side of the center of the vein and 1500 feet in length. Section 2333 fixes the area of a vein or lode claim within the limits of a placer patented to the same person at 25 feet of the surface on each side of the vein or lode. Therefore, a lode claim within the limits of a placer location, patented by a person other than the owner of the placer location, is limited to 25 feet of the surface on each side of the middle of the vein. A placer location confers neither title to nor possession of, nor withdraws from subsequent location by others, known lodes or veins of mineral in place within its limits, under the last section named above, which provides that a placer patent, failing to include a patent for a vein or lode claim known to exist within its limits, shall be deemed a conclusive declaration that the placer claimant has no right to same. Since a placer patent confers no possession to known lodes or veins within its limits, a subsequent location of a vein or lode within the limits of the placer claim is not a trespasser, as against the placer claimant, within the rule of law that a trespasser on a lawful possession can acquire no rights. But a located lode claim is an interest in real property which, as against all but the United States, is treated as a fee, and will support an action to quiet title, under a law authoring a person in possession of real estate to bring an action to determine adverse claims to same.

Mining Conditions in Korea.

Written for the MINING AND SCIENTIFIC PRESS.

Korea is a mountainous country about the size of the State of Washington, having a rough and forbidding coast line and no rivers of importance. The enormous height of the tides, which on the west coast rise over 30 feet above low water, are a hindrance to navigation and force the ships to anchor usually a long distance from the shore and transfer freight and passengers by small boats. The climate is similar to that of the middle Atlantic States, the temperature rising close to 100° in summer and falling a few degrees below zero in winter. The annual rainfall is not excessive, but the greater portion of it comes in the months of early summer which are known as the rainy season. During this time the rain does not fall incessantly, as is sometimes supposed, but there are many pleasant days. Before the approach of this season the bridges are taken up, to be replaced as soon as the floods have subsided, and traveling in the interior is not pleasant.

The people of the interior are largely farmers, and the river valleys and sloping hillsides are carefully tilled in every available spot, as it is necessary to feed the fifteen millions of population which the country supports. Millet is the farinaceous food staple, but the crops include rice, potatoes, Indian corn, buckwheat, beans, cotton, tobacco, cabbage, turnips and many other vegetables, some unfamiliar to Western eyes.

The native houses are comfortable, picturesque and well adapted to the climate, and the people are peaceable, cheerful and hospitable. They do not all realize the importance of honesty, truthfulness and cleanliness; their ideas of virtue and modesty are not the same as ours; their dress is peculiar, and that of the women and children shocking to American eyes; but, considering their opportunities and the government under which they live, they are a good people.

There are only 17 miles of railroad in the country —a line from the capital, Seoul, to its seaport, Chemulpo. The five open ports are reached by small steamers from Japan, and a little coasting trade is done by native steamers and junks. In the interior the backs of bulls, ponies and men carry most of the commerce of the country. Heavy machinery for the mines is taken up the rivers as far as possible on flatboats and then transferred to heavy native two-wheeled carts, drawn by bulls or cows. These carts are too wide and heavy to cross the bridges, so they must ford the rivers and take their chances on the rough and narrow roads.

Mining machinery comes almost entirely from San Francisco and is of the type common to all our Western gold mining camps. Stamp mills of modern design, driven by Corliss engines, followed by belt vanners, extract the gold from ores drawn by American hoists from mines drained by American pumps. A Korean mining camp is a reproduction of many a scene in the California hills. The buildings are of hewn pine timbers, covered with boards cut by the natives with whipsaws made of the iron bands which come around bales of cotton cloth. Sash and doors are built on the ground by Japanese carpenters. Cordwood for the boilers, brought in on the backs of men and bulls, is cut from the scanty growth on the higher ridges, whence comes also the supply of charcoal for the assay furnaces and the blacksmith shop. Rice, millet and some other articles of food are obtainable in the near-by market towns, but many of the foods craved by foreigners must be specially grown or imported. The rates of ocean freight from San Francisco, New York and London differ but little; so that mining supplies can be drawn from either market, as prices invite. At present dynamite comes from Glasgow, steel from New York and candles from San Francisco, while the lesser wants are mostly obtained from the United States.

The mine and mill superintendents and foremen come from the United States, most of them graduates of well known California mining camps. There are a few foreign mechanics, but the greater part of the skilled workmen are Japanese, who make very good engineers, carpenters and blacksmiths. The staff of accountants and storekeepers is largely composed of young Englishmen and Americans who have been some years in the Orient and are familiar with the people and language. A few Chinese coolies are employed, mostly in outside labor; but the great bulk of the common labor and practically all the mining is done by native Koreans. They take readily to American tools and methods, but it is hard to keep them steady. To get anything like efficient labor from them requires constant surveillance. When they get a little money ahead, saved from their wage of 25 cents per day, they must quit work until it is spent and they begin to feel the pangs of hunger, when they are again ready for labor. There are some notable exceptions, who are as faithful, honest and efficient men as can be found in any country. Some are shift bosses in the mines, some are acting as interpreters and assayers, and others are running hoists with as great care and freedom from accident as engineers anywhere.

The money of the country is the brass "cash," a small coin with a square hole in the center, roughly cast of varying size and worth about one-twelfth of a cent. The miners are paid in Japanese silver, but the greater part of the supplies obtained from the natives, such as mining timber, building material, charcoal, rice, eggs, etc., are paid for in "cash," and the doing of any considerable amount of business with such cheap and heavy money involves much trouble and expense.

There are no banks and no system of exchange. Bullion must be transported long distances on the backs of ponies before it reaches a port from whence it can be shipped to Japan, where it is marketed. High-grade concentrates are shipped to the United States, while those of lower grade are worked on the ground by the cyanide process.

Not the least among the discomforts of life in such a country for an American is the fact that a trip to the nearest dentist takes two or three weeks and the nearest barber and shoemaker are nearly as far away. AMERICAN MINER.

Seoul, Dec. 1, 1900.

Relative Heat Conductivity.

TO THE EDITOR:—I am much interested in—although I disagree with—the paragraph in your issue of January 5 comparing the heat conductivity of copper and steel.

As the originator and introducer of aluminum cooking utensils, camp outfits and steam-jacketed kettles, eight years ago, I made a great many experiments in the heat conductivity of metals. I place the heat conductivity of metals as follows:

Silver	100
Copper	75
Aluminum	60
Steel	20

While your remarks upon the resistance heat encounters on the water side (when dead) of the plates are correct and substantiated by the vastly higher evaporation in all rapidly circulating boilers, you must admit that the film of burnt gas or soot is the same in both cases—that is, in using either copper or steel plates. Therefore I mean to state that the heat, once past this resistance, will show a far greater advantage than 1% in passing through copper plates, which possess at least three times more heat conductivity than steel plates.

The British locomotive builders still use copper fireboxes and copper tubes, and you will find that their engines burn far less coal per indicated horse power than the American engines.

I don't agree with the statement that thick plates make little difference. I remember having to do with a large boiler once which had a thick, double-riveted seam right in the center of the firebox. The boiler was very hard fired and I was startled by seeing the rivet heads drop off every week as fast as we replaced them, and I should not have dared to run the boiler at all if there had not been a huge stay bolt from end to end, thereby relieving the rivets of part of the longitudinal strain. I soon replaced the two plates with a wide plate and there was no more trouble.

You may be quite sure of one thing: If the effect of the water could not be felt on the fire side of the rivets, owing to their extreme length, the effect of the fire on the water side of the rivets was equally inoperative to raise steam.

You have a man in San Francisco—Irving M. Scott —who ought to be able to say whether I am right or not. I can suggest an experiment which will remove all doubts on the subject. JAS. C. ASHTON.

Highland Park, Ill., Jan. 9.

Largest Coal Conveyor in the World.

At Cape Breton, on the large coal dock of the Dominion Coal Company, the conveyors are in full operation. Loading was formerly accomplished by railroad cars operated on a two-level system of standard gauge double track, the cars being lowered, after emptying on the upper level, by a drop-table.

After being lowered they returned by gravity to the inshore end of the dock. This system worked admirably when there was a full supply of coal in the cars, but was expensive. The Robins Conveying Belt Company designed and carried out the present installation, consisting of a storage of 10,000 tons in bins under the railroad at the inshore end of the dock and mechanical means for carrying the coal from the storage and delivering it simultaneously into three or four hatches of a steam collier lying alongside the dock.

This is accomplished by means of two belt conveyors of large size, the first of which runs through a tunnel under the storage bins, then rises to a height of about 25 feet, at which point it delivers its load to the second conveyor, which elevates the coal an additional height of 35 feet to a point 30 feet above the track level of the dock. At this height it is carried the entire length of the dock, with unloading devices at three or four points, by means of which a part of the coal on the belt can be deflected into chutes which run down to the collier's hatches.

The regular working capacity of the conveyors is 750 tons per hour; this quantity of coal can be carried a distance of 1000 feet and delivered into a vessel without interfering with the former car system.

One of the cuts shows the coal dock with the conveyor structure in place. The interior view shows one of the conveyors in operation, but only partially loaded. It is stated that the total cost of loading the coal by this system, including interest and depreciation, power and labor, is less than one-quarter of a cent per ton.

Robins Conveyor in Operation.

Coal Dock of Dominion Coal Co. at Cape Breton, With Robins Conveyor.

The Leaching of Copper Ores.

NUMBER II—CONCLUDED.

Written for the MINING AND SCIENTIFIC PRESS by DR. J. OHLY.

As to the erection of a lixiviating plant a gently sloping hillside is always chosen with predilection, so as to allow of the placement of the several circular vats or tanks on succeeding platforms or terraces cut into the hill. The first tank, placed on the uppermost terrace, is usually lined with lead sheeting, and serves as a reservoir for the concentrated sulphuric acid to be added by means of an automatic siphon system to the second tank, which contains the ore covered with water. Such lining becomes a necessity almost, in case concentrated acid is used, but may be discarded entirely on applying chamber acid, which will not affect the inner surface of the tanks to any marked degree. It appears also from observations made by the writer, that the preservation of concentrated sulphuric acid in wooden vats can be successfully accomplished without applying any protective lead sheeting, since the acid merely chars the inner surfaces of the vats, and the carbon layer thus produced forms a good resisting surface against the further action of the liquid. These vats, which usually have the dimensions 4 feet in height by 8 feet in diameter, so as to allow of the treatment of a ton of crushed ore at a time, are heavily hooped and placed on wooden supports, so as to isolate them. Almost any kind of wood, from oak to spruce, will answer for their construction, provided the staves are of sufficient thickness to form a strong and solid wall with steady bottom, so as to allow of a ton charge being made without risk.

The tanks in which the electrolytic separation of the copper is to take place are usually made of wood, also, and are either lined with sheet lead or simply provided with a coat of tar, gilsonite, or elaterite—preferably the latter. The sizes of these tanks vary greatly, however, a depth of 3 feet 6 inches and a breadth of about 4 feet being the most common dimensions. They rest on a wooden trestle, so as to isolate them, and are built sufficiently strong to withstand the outward pressure of the solution and the weight of the copper anodes, cathodes, and conducting rods resting upon them. The anodes, which are made of raw copper, are placed in a row opposite the cathodes, cut of thin sheet copper about 2 inches apart, and both reach within nearly 4 inches of the bottom of the tank, thus leaving sufficient space for the deposition of the slimes.

Under these conditions, and on employing an electromotive force of 0.5 volt., the gold, silver, platinum, tin, arsenic, antimony and lead, eventually present present in the solution, pass into the slimes, while other metals are not precipitated from the solution except by prolonged standing after saturation. The most electropositive metals—nickel, cobalt, iron and zinc—are dissolved from the anode at the same time as the copper, but are not dissolved at the cathode on account of the low electromotive force employed. The bath, which is originally formed of an acid solution of copper sulphate or chloride mainly, thus gradually becomes enriched with metals of this group, and, at the same time, becomes poor in copper. Hence, pure copper alone is deposited at the cathode, but the deposit becomes less and less satisfactory toward the end of the operation, so that at a certain moment the solution must be drawn off and replaced by a fresh charge.

The reddish-brown, pulverulent copper which separates out at that stage of the process is caused by the occurrence of a certain concentration of the solution too weak in ions of copper, and, on continuing the action of the current, a point is reached at last where only spongy copper is precipitated. An addition of sulphuric acid in no way remedies this inconvenience, but even tends to favor the formation of spongy copper. The only practicable method applicable consists, therefore, in the withdrawal of the liquid and the precipitation of the copper from it by means of hydrogen sulphide (sulphuretted hydrogen) and to proceed with the electrolysis in a fresh bath. The use of hydrogen sulphide to precipitate the rest of the copper is, furthermore, less expensive than the introduction of anodes, either insoluble or composed of electropositive metals.

It becomes evident, then, from the foregoing that the electrolytic process allows not only of the production of copper of a high degree of purity, but that it also permits the recovery of gold and silver values, besides other metals mentioned above, and incidentally present in the electrolyte.

A Most Surprising Statement.

Job Hedges of Azusa, Los Angeles county, Cal., writes us as follows: "In looking over the Engineering and Mining Journal of May 5, 1900, I noticed an inquiry for complex sulphide tin ore, containing antimony, arsenic, silver and lead, or any of these that can be obtained in large quantities. I would state that my company has immense bodies of tin ore, carrying a large per cent of gold in tellurium form, and a smaller percentage of silver-bismuth and arsenic, and perhaps other metals. I would be glad to give any further information desired.—New Zealand Engineering and Mining Journal, Dec. 6, 1900.

Electrolytic Refining.*

In 1889, according to the census, the United States produced nearly 80,000 short tons of fine copper, of which less than 25,000 tons were obtained electrolytically. Only five years later the production of electrolytic copper in the United States alone had risen to over 57,000 tons, or nearly one-third of the world's output at that time, and it steadily increased until in 1900 it reached the total of 211,000 tons, or about 422,000,000 pounds. This is eight times what it was ten years ago and equal to half of the entire copper production of the world.

The estimated daily output of the eleven copper refineries in this country is 579 tons. From the copper treated are obtained gold and silver slimes containing over 53,000 ounces of silver per diem, or over 19,400,000 ounces per annum, besides nearly 174,000 ounces of gold. It thus appears that more than one-third of our total silver output is now derived from copper ores. The cost of refining copper to-day is but half of what it was ten years ago. Contracts have been recently closed for refining copper anodes for as low as $8 per ton.

The object of electrolytic copper refining is twofold: First, the saving of the gold and silver always found in crude copper, and, second, the separation and removal of the bulk of the impurities, such as antimony and arsenic, from the fine copper, so that the latter will possess a high electrical conductivity and will be suitable for drawing into wire, or pure enough for the various uses for which copper is required in the arts.

There are at the present time only two systems of refining in commercial use—the multiple and the series system. The series or Hayden system is in use at only two refineries, one at Baltimore and the other at Brooklyn, and is only advantageously employed where the crude copper to be refined is of uniform high grade and can be rolled out into smooth, long sheets about ¼ inch thick. In the usual or multiple system the anode sheets are cast into plates and not rolled, and they are usually 1 and 2½ inches thick.

As the series system requires a rolling mill, which will consume about one-third of the power of the plant, and a special refining of the crude blister copper to adapt it to rolling, it is not in general use in the United States.

The composition of typical anodes of refined blister copper is as follows: 99.250% copper, 0.338% silver, 0.001% gold, 0.300% oxygen, 0.054% antimony, 0.033% arsenic, 0.009% lead, 0.008% selenium and tellurium, 0.002% bismuth, 0.002% nickel and a trace of iron.

After being electrolytically refined and melted into wire bars and other shapes for rolling and conductivity purposes, the commercially pure electro-deposited copper obtained from such anodes has approximately the following composition: 99.925% copper, 0.001% silver, 0.070% oxygen, 0.002% antimony, 0.001% arsenic and 0.001% lead.

The chief characteristic of modern copper refining in the United States is the introduction and adoption of efficient labor-saving devices, both to and from the melting furnaces and the electrolytic tanks. Thus the largest and probably the best equipped electrolytic refinery in the world, i. e., the Raritan works of the Lewisohn Bros. at Perth Amboy, N. J., is provided with a simple and very effective casting arrangement, in which the molten copper is tapped from the melting furnaces into moulds attached to an endless conveyor, running in front of the furnace, but sunk below the floor level and covered by removable iron plates, so as not to interfere with the approaches to the furnaces in any way.

In the tank-room a full tankload of electrodes is handled at one time by means of a rack-frame and traveling crane, and charged into one of the 1600 tanks in the refinery referred to, or discharged therefrom, as desired. This means a great saving in the labor item alone, besides facilitating very rapid work. Considerable quantities of copper matte and bullion are now shipped from many parts of the world to the United States to be treated, chiefly because refining costs less here than in Europe, due to the capacities, equipment and management of leading electrolytic refineries.

* Titus Ulke, in Electrical Review (condensed).

The Utmost Accuracy Required.

TO THE EDITOR:—In your issue of date Dec. 19, 1900, "Concentrates" says: "A $20 gold piece weighs 516 grains=1.076 ounces. Of this, 90% is pure gold and 10% copper," etc. In checking up the figures in that paragraph, assuming that the value of one ounce of pure gold is given correctly (viz., $20.671834625), the actual amount of pure gold in a $20 gold piece is $19.9999999997, instead of $19.9981999368, as given. That is, a new $20 gold piece lacks $0.0000000003 of $20 worth of pure gold—it is "short" the three hundred millionth part of a cent. This, of course, assumes that there is no error, typographical or otherwise, in the stated value of one ounce of gold—$20.671834625. I grant you that this is not of great practical importance, but if you insist on having your calculation carried out to ten decimal places, you should have them correct to the ninth figure! C. J. TILDEN.

New York City, Jan. 19.

Power-House Explosion.*

Five men were killed and seventeen seriously wounded by the explosion of a boiler in the power house of the Northwestern Railway Co., at Kinzie and Kingsbury streets, Chicago, Ill., at 5 P. M. on the 3rd ult. The 10-ton boiler—one of a battery of four in the plant—was hurled through the south wall, crashing through a parlor car in a passenger train outside. The damage done to the power house was about $55,000; the traffic of the road seriously delayed.

Beside its traction power, the plant furnished energy for the electric lighting of the entire neighborhood, which was instantly plunged into darkness. Thousands of people waiting for trains to get home were delayed for hours and finally compelled to take surface cars, as the cutting off of the power prevented the working of the semaphores and switches, so that every switch had to be worked by hand for three hours after the disaster.

The four return tubular boilers were each rated at 150 H. P. The boiler that exploded was lifted from its setting, flung through the wall and on the other side of the track, 66 feet away. The illustrations on the front page are from photographs taken immediately after the accident and graphically depict the exact appearance of the immediate surroundings. The upper picture to the left shows the wrecked boiler room on one side of the C. & N. W. Ry. tracks, and the exploded boiler on the other side.

There is considerable mystery surrounding the cause of the explosion, the latter being of the most interest to readers of this journal. The boilers were of approved standard make, and in charge of careful and competent men, were subjected to weekly inspection by the owners and every month by the largest and best known boiler insurance company in the country, which carried insurance on them. Each of the boilers was tested to a pressure of 150 pounds; the chief engineer and general superintendent say that ninety pounds was the limit to which they were used. The assistant engineer was a man whose hobby was to keep the boilers full; he says he inspected the gauges three minutes before the explosion, and that they showed plenty of water then. All the men employed were licensed. The superintendent thinks the cause was a probable weakened or rusted plate, so located that it escaped the observation of the inspectors. The illustrations themselves throw some little light on the disaster.

The Engineer, from whom the illustrations were secured, is of the opinion that the initial fracture may have occurred at or near one of the convilinear seams, probably the one farthest from the bridgewall.

The form of longitudinal joint used in these boilers is a strong one under normal conditions of pressure, but, when the plates are torn longitudinally, the cover plates offer no more resistance than any other part of the shell. This may account for the failure of the joint, as indicated by the appearance of the flattened plate. The tendency of boilers at the instant an explosion occurs is to move in the opposite direction from that of the escaping water and steam, the reaction occurring with sufficient force to lift that part, which is free to move far above its foundations. The further fact is pointed out that the flattened plate contains the manhole which is located back of dome, indicating that the initial rupture, where ever it may have started, occurred back of the dome, for it was the forward part of the boiler that landed across the railroad tracks.

The convilinear seam farthest from the bridgewall is subjected to a wider range of temperature than the others; hence, the shell and seams in this region would be more liable to fail, other things being equal, than nearer the bridge, or at the ends of the boiler, and this would be more likely to fail than the longitudinal seam itself in a boiler embodying this construction.

A seam of the style employed in these boilers becomes an advantage only when it is properly made. That a boiler has such a joint is not conclusive evidence that the boiler is any stronger than those employing the more common form of joints. It is seldom that a boiler with butt joints explodes, and, because of this, a definite knowledge of the cause of this explosion would be of value.

In general connection with this entire subject, it is a noticeable fact that steam boilers are the frequent cause of mysterious explosions. If one runs through the records he will find innumerable cases where investigation, inquests and the most searching inquiry have shown that the engineer left the boiler filled to the proper point with water, the fires all right, all parts of the machinery in good working order, and all hands intelligent and alert; and yet, in a few minutes, an explosion has occurred, wrecking the building, killing several people and greatly damaging surrounding property. It is no wonder that so many engineers are superstitious, and think that an engine is sometimes "hoodooed."

The only thing that can in general be said is that such disastrous explosions as the one herein portrayed and described exemplify the necessity for the best of material and shop construction, and the exercise of constant vigilance on the part of the operators and inspectors.

* See illustrations front page.

Sinking Through Quicksand.

To the Editor:—A short explanation of a method of sinking through a combination of quicksand, water and boulders may be of interest. The object was to get a large amount of water which was known to exist at a depth of about 60 feet. An old well had been put down, the timbering of which resembled a series of boxes, one inside the other, each one smaller than the last put in. Towards the bottom a miner had tried to improve on this method by driving lagging instead of using boxing. This was a failure on account of the boulders forcing in the points of the lagging, so that after two sets had been driven the space at the bottom was reduced to a little over 2 feet. Several oil drillers then tried to get down with a 7-inch casing and drilling rig, but struck hard boulders and quit. The method successfully used was as follows: The depth to water being known to be 60 feet, it was presumed that a depth of 72 feet would give all the water required. A crib made of 3-inch pine boards, laid horizontally, was constructed 8x8 feet in the clear, being built on above ground as the crib went down, each succeeding board being cut shorter, so that the last one on top should measure 5 feet. This would give a shaft 72 feet deep, 8x8 feet at the bottom and tapering to 5x5 feet on top. The excavation being always large enough to allow the big end below to sink, the portion above was continually tending to free itself from side pressure. It was intended to use four jackscrews above to force it down, but this was done by heavy weights to a depth of 60 feet. At that point, as the ground was very treacherous with quicksand and water, another crib was built in the bottom—7x7 feet—built up the same as the other and tapered. This was forced down by jacks bearing against the crib above. The first crib was anchored above to heavy crossbeams by chains to prevent its sinking farther, and the pump—a 6x6-inch Hooker double action—was fastened at its lower end by cross stays, with guides above, also fastened to the crib, for the pump rods from pump to pump jack. The result was entirely successful, and there was practically no hitch from beginning to end. The ground would settle and cave some around the sides of the crib, but interfered very little.

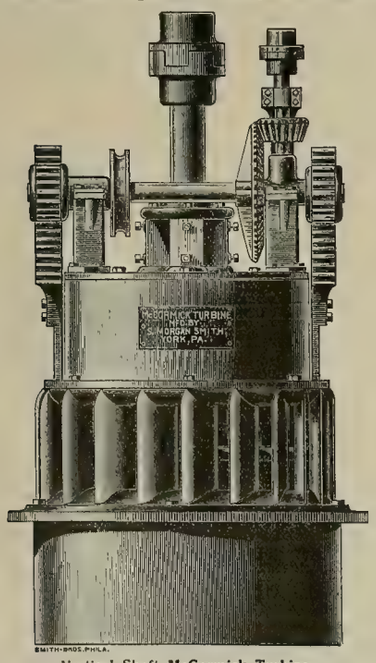
Frederick Grundy.

Santa Barbara, Cal., Jan. 23.

The McCormick Turbine.

From S. Morgan Smith Co., York, Pa., is received the fourth edition of their illustrated catalogue of their McCormick turbine, manufactured by them, describing that water wheel in detail, giving directions for the construction of head and tail races, setting wheels, tests and tables, details of capacities of different sizes, with prices of from 9 to 24-inch wheels, with rules for water measurement and various tables.

The S. Morgan Smith Co. have furnished several of these wheels to concerns on the Pacific coast. Engravings 18, 19 and 32 of the catalogue represent turbines installed by the Sacramento Electric, Gas & Railway Co. of Folsom, Cal., described herein in full at the time. The plant represented by engraving No. 19 has been in operation six years. Each pair



Vertical Shaft McCormick Turbine.

of turbines develops 1250 H. P., and the main shaft leading from the turbines is directed connected to a 750 K. W. generator. The head of water under which these wheels operate is 55 feet. The turbines represented by engraving 32 develop 1300 H. P. and are operated under about 28 feet head. The company has lately installed for the Boston & Montana Consolidated Copper & Silver Mining Co. of Great Falls, Montana, a pair of their 54-inch turbines in iron case on horizontal shaft which develop 2800 H. P. under 40 feet head. The power is being used for operating a generator and a large air compressor. The Washington Water Power Co. of Spokane are using two pairs of their 33-inch turbines, each pair mounted in an iron case, the shaft of the water wheels being direct connected to a generator of 1700 H. P. capacity. These turbines operate under 74 feet head. The Walla Walla Gas & Electric Co. of Walla Walla, Wash., are using one of their 27-inch wheels under 90 feet head for operating their electric plant. The Truckee General Electric Co. at Virginia City, Nevada, have a pair of these turbines in use, each of which develops 1400 H. P. under 84 feet head, direct connected to a generator, the power being transmitted to the Comstock mines.

The Bunker Hill & Sullivan Mining Co. of Wardner, Idaho, are using a pair of their horizontal shaft wheels under 55 feet head. The Floriston Pulp & Paper Co. of Floriston, Cal., have in use their wheels aggregating 5000 H. P. under 50 feet head. The Oregon City Manufacturing Co. are using a pair of their horizontal shaft turbines, mounted as shown by engraving No. 33, page 69 of the catalogue. The Willamette Pulp & Paper Co. and the Crown Paper Co. of Oregon City, Or., have a number of their wheels in use. Engraving 34 represents an installation of their turbines near Salt Lake City, Utah.

The Stanislaus Milling & Power Co. of Oakdale, Cal., have recently installed a pair of their turbines under 140 feet head, which are developing 1400 H. P. and are used for operating electrical machinery.

Thos. Prather of Yreka, Cal., is using one of their horizontal shaft wheels under 40 feet head, driving a power pump.

The illustration herewith shows their vertical shaft McCormick turbine. The catalogue will be sent to any address upon request.

Gwin Mine Cost Sheet.*

Following is the cost sheet of the Gwin mine, Calaveras county, Cal., for the month of July, 1900, furnished by J. J. Crawford, Secretary of the Company:

Items of Expense.	MINING	MILLING	SULPHURETS
	And transporting to mill 7965 tons.	8000 tons.	Concentration, transportation and reduction charges on 108.545 tons.
	Cost per ton.	Cost per ton.	Cost per ton.
	$ cts.	cts.	$ cts.
San Francisco office—salaries, directors' fees and expenses	.0082	.0084	.....
Management	.0314	.0313	.....
Mine office—salaries and expenses	.0129	.0075	.....
Labor	1.3886	.0653	3.418
Water	.0650	.0875	.746
Electric light	.0013	.0022	.051
Timbers	.2754	.....	.....
Lagging	.0692	.....	.....
Wedges	.0103	.....	.....
Lumber	.0050	.0031	.....
Powder	.0470	.....	.....
Fuse	.0080	.....	.....
Caps	.0020	.....	.....
Candles	.0335	.....	.....
Drill steel	.0085	.....	.....
Iron and steel	.0014	.0013	.....
Tools and implements	.0055	.....	.....
Hardware	.0201	.0005	.....
Charcoal	.....	.0003	.....
Oils and lubricants	.0035	.0017	.....
Shoes and dies	.....	.0600	.....
Screens	.....	.0007	.....
Chemicals	.....	.0002	.....
Average loss of quicksilver for four years	.....	.0070	.....
Miscellaneous supplies	.....	.0020	.275
Surveying	.0072	.....	.....
† Assaying ..... apportioned	.0008	.0034	.212
† Blacksmith shop ..... apportioned	.0341	.0053	.....
† Pumps and repairs ..... apportioned	.0301	.....	.....
† Power drills and repairs ..... apportioned	.0017	.....	.....
Legal expense	.0025	.0006	.....
† Equipment and construction ..... apportioned	.0413	.0665	.....
‡ Development ..... apportioned	.0045	.....	.....
Taxes ..... apportioned	.0370	.0081	.....
Stable and animals ..... apportioned	.0082	.0006	.....
Compressor—labor and supplies	.0272	.....	.....
† Compressor ..... apportioned	.0210	.....	.....
† Telephone line ..... apportioned	.0012	.0004	.....
† General improvements ..... apportioned	.0100	.0038	.....
Hauling sulphurets and back freight on sacks	.....	.....	2.203
Reduction charges and railroad freight on sulphurets	.....	.....	9.491
Total cost per ton	$2.2236	$0.3677	$16.396
For purpose of comparison the following items may be transferred from "Sulphurets" to "Milling" column:			
Labor	.....	.0464	.....
Water	.....	.0100	.....
Electric light	.....	.0007	.....
Miscellaneous supplies	.....	.0037	.....
Assaying	.....	.0028	.....
Totals	.....	$0.4313	$11.694

† Because of the deterioration of the machinery, etc., represented by these accounts, 1% per month of their cost and repairs is inserted in this report.

‡ The development is apportioned according to the estimated life of that part of the mine affected by it.

* Bulletin No. 18, California State Mining Bureau.

Smith-Vaile Direct Acting Pressure Pump.

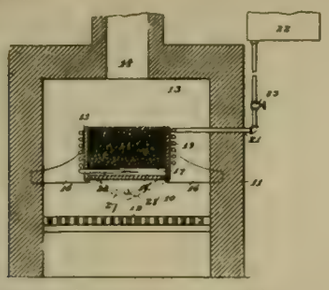
Herewith is illustrated one of the latest constructed compound direct acting pressure pumps, one of the largest of its type built, and to be installed by the Columbia Gold Mining Co. of Oregon, to be operated condensing. The pump was built for mine station work, the water end being designed for a working pressure of 600 pounds per square inch. The valve seats are of bronze, seating on steel seats located in individual chambers easy of access. The

entire water end is made of a special semi-steel composition. An extension piece is provided with an adjustable shoe for the guidance and support of the plunger. The water plungers are of bronze and of the trombone type and packed, reciprocating through deep glands especially accessible. The entire end is mounted on heavy cast-iron foot pieces. The steam end is of the crosshead type, lagged in polished steel. Steam valves are of the semi-Corliss type, the area ports for the induction and eduction of steam being especially liberal. The valve adjustment is on the outside. Special equalizing valves are provided, and the rock stand supporting the valve gear is located in such a manner as to least interfere with the inspection of the working parts and to obviate any trouble due to vibration. The crossheads are of a special type, being guided on the lower tie rods. The manufacturers are the Stillwell-Bierce & Smith-Vaile Co., Dayton, Ohio, U. S. A.

Mining and Metallurgical Patents.

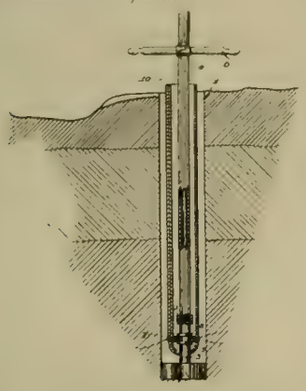
Patents Issued January 15, 1901.

CRUCIBLE OR RETORT.—No. 665,880; A. A. Crosby, Chicago, Ill.



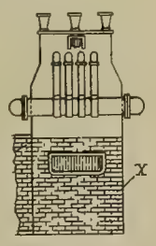
In apparatus for roasting or smelting ores or like, combination with heating furnace, of crucible located within combustion chamber, adapted to be heated thereby, pipe for introducing hydrocarbon fuel to interior of crucible, supply pipe having portion exposed to furnace heat whereby hydrocarbon is vaporized, delivery end extended into crucible terminating near bottom wall, causing combustible gas to pass upwardly through charge.

TUBE FOR TUBULAR WELLS.—No. 665,886; G. C. Dimock, Newman Grove, Neb.



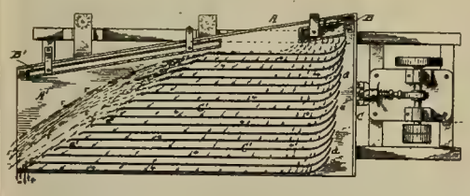
Combination of earth auger, having stub stem, rotatable shaft operatively detachably connected to stem, opposite annular flanges upon intermediate portion of stem, head loosely receiving stem held between flanges, tubular well-casing inclosing shaft, terminating short of auger, snugly receiving head within lower end, head forming closure for lower end of casing, fastenings driven through casing into peripheral edge of head, whereby latter and casing are fixedly connected, remain stationary, with respect to rotary movement of shaft.

FUME CONDENSING APPARATUS AND FUEL ACCUMULATOR FOR SMELTING FURNACES.—No. 665,919; C. C. Loder, Denver, Colo.



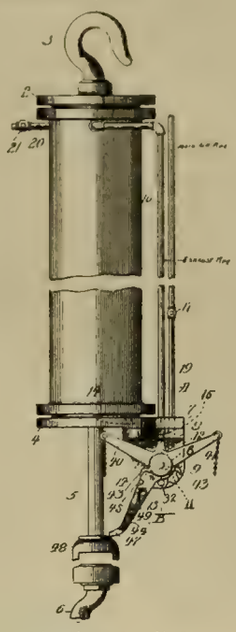
Combination with furnace, of draft chamber connected therewith, cooling device mounted in draft chamber, tank having inlet and outlet passages directly connecting with upper portion, former communicating with draft chamber, tank containing water or solution to level just below passages, vane wheel mounted in tank, closely fitting, means for rotating vane wheel in direction to move vanes through space above water or solution toward exit passage, condensing tank with which last communicates.

ORE CONCENTRATING TABLE.—No. 666,002; W. G. Dodd, San Francisco, Cal.



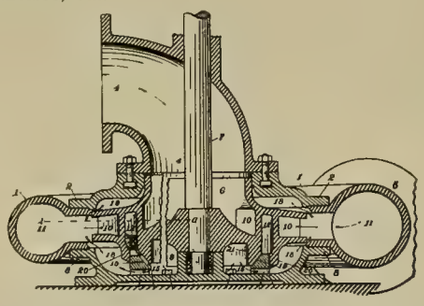
A reciprocating ore concentrating table having plain or unriffled foot or tail portion, obstructing riffle arranged upon working face of table intermediate its head end and its plain or unriffled foot or tail portion, riffle being upwardly inclined at its head end and downwardly inclined at its discharge end and having that portion intermediate its upwardly and downwardly inclined ends approximately longitudinal with working face of table, riffle gradually decreasing in height from its head end toward its foot or discharge end.

FLUID PRESSURE HOIST. — No. 665,993; N. A. Christensen, Milwaukee, Wis.



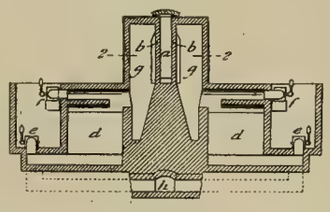
In a hoist, combination of cylinder, piston therein having piston rod with projection on lower end, valve device governing fluid pressure, levers for operating valve to admit or release pressure, depending arm swiveled on valve device with two lateral lugs, lower end of arm arranged in path of travel of projection on piston rod to be raised thereby to cause one lug to contact and move one lever to close valve, device having projection against which other lug strikes to stop downward movement of arm.

CENTRIFUGAL PUMP.—No. 666,023; H. Perry, San Francisco, Cal.



In centrifugal pump, impeller provided with main and auxiliary passages located in spaces between formed by side walls of main passages, inlet way communicating with and supplying water to main passages, balancing chamber of approximately same area as inlet way, opposite inlet way on other side of impeller, in communication with balancing source of pressure, communicating with supplying water to anxiliary passages in impeller.

METALLURGICAL FURNACE.—No. 666,155; A. Reynolds, Sheffield, England.

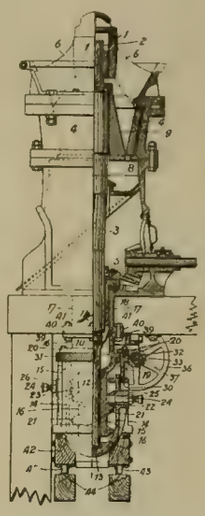


Metallurgical furnace having therein vessel to contain mineral or metal treated, vessel having end walls supported against furnace casing, and unsupported side walls curved inwardly, means for directly heating side walls.

PROCESS OF ELECTROLYTIC PRODUCTION OF NICKEL OR ALLIED METALS.—No. 665,915; M. Kugel, Berlin, Germany.

Process for electrolytic production of tough, rollable nickel and allied metals, consisting in subjecting same to action of an electric current, in an electrolyte, temperature of which is over 30° Centigrade, keeping electrolyte acid by addition of strong mineral acid not chemically changeable by current, and adding highly concentrated solution of light metal salt not changeable by current, to facilitate maintenance of uniform acidity without addition of more acid.

CRUSHER.—No. 666,129; E. D. Chester, London, England.



Combination with upright gyratory spindle and crushing cone carried thereby, of means for supporting vertically adjusting one within crushing hopper or concave of machine to vary size of fragments produced by machine while latter is at work, means comprising foot step bearing for gyratory spindle, vertical shaft supporting bearing: vertical guide sleeve for shaft fixed to framework of machine; box carrying step bearing for shaft mounted upon rollers supported adapted to run upon helical rib in one with guide sleeve; casing rotatably slung from framework of machine externally adapted to afford freedom of vertical but not of rotary movement relatively to casing; means for rotating casing so that rollers may be caused to ascend or descend upon helical rib to adjust level of crushing cone while machine is in operation.

Smooth-On Iron Cements.

The Smooth-On iron cements are used for so many purposes that it may be interesting to know about them and some of their uses. These cements are prepared in powdered form and packed in one, five and twenty-five pound tin cans, in which they can be shipped to any place. The Smooth-On iron cements No. 1 and No. 2 are made especially for and used by marine and stationary engineers—No. 1 for repairing leaks or making connections on steam or hydraulic work and No. 2 for coating the inside seams and rivets of leaky steam boilers. It can be applied with a brush.

To apply these cements they are mixed with water according to the directions on each can, and in a short time the material hardens, becoming as solid iron. During the process of hardening the cement expands slightly, and by this action becomes valuable for mechanical uses. When hard Smooth-On is insoluble in water, steam or oil, and it will withstand a red heat; its conductivity is the same as iron.

The slight expansion of Smooth-On iron cement when hardening causes it to fill a hole or opening to which it is applied. In metal ship building, steam engine and boiler building, under steam boiler patches, mainstay brace and stayscrew nuts and for making permanent joints on flanged or screw-thread joints, where exposed to high temperatures and pressures, it is of value. The following is one of such repair jobs made with Smooth-On compound:

Mr. Vreeland Tompkins, Chemist, Jersey City, N. J.—DEAR SIR: I am happy to state that your Smooth-On compound proved a perfect success on a very bad joint I had on the dome of our boiler, from which a great many branches run. It would have cost from $12 to $15 to take the header off and make an ordinary joint. I simply took the engineer's packing hook and picked out a part of the old joint, which was about $\frac{3}{32}$ inch thick, for $\frac{3}{8}$ inch inside of the edge of the flange all around, and put in your compound. It took a man one and one-half hours to pick out the part of the old joint and one-half hour to mix and put in your compound, which he did with a common table knife, and to our surprise next morning we had a perfectly tight joint. I must say that it is the best and handiest thing for the purpose that I ever saw, and would recommend every engineer troubled with leaks to give it a trial. Yours truly,

WILLIAM MCILVRID, Supt.

240 Eleventh St., Jersey City, N. J.

The manufacture of the Smooth-On iron cements is under the supervision of a chemist. For further particulars apply to the Smooth-On Mfg. Co., Jersey City, N. J., or to Messrs. Madison, Bruce & Sellers, 34 Steuart Street, San Francisco, Cal.

MINING SUMMARY.

Specially compiled and reported for the MINING AND SCIENTIFIC PRESS.

ALASKA.

E. N. Carpenter reports provisions scarce at Circle City, owing to severity of the weather; no work is being carried on.

ARIZONA.

COCHISE COUNTY.

The new 350-ton hot-air smelting furnace now being put in by the Copper Queen Co., at Bisbee, will be in operation next month.——The Lowell & Arizona M. Co. has resumed operations.

Supt. Henry is pushing work on the Black Diamond, near Dragoon. The lower tunnel will cut the ore body at 500 feet depth.

GILA COUNTY.

Lawrence Bros. are sinking on the Glissan & Lawrence property, near Dripping Springs.

The Old Dominion reports a 25-foot vein of sulphide ore running 13% copper.

GRAHAM COUNTY.

Work on the new smelter, near Clifton, is progressing.

MARICOPA COUNTY.

Gray Bros. are operating the Lookout claims, near Phœnix.

MOHAVE COUNTY.

The Fairfield, at Rawhide, is shipping ore and concentrates; F. Cofer, owner.——Ore is being mined on the Midas and Friends mines, in Aubrey district; product will be run through the Tremain mill recently put in on the Midas.——J. Haas is pushing work on his turquoise mines at Mineral Park.——The McCracken, 12 miles west of Signal, is being examined by Eastern buyers.——Supt. Blandy will soon begin operations on the Elkhart, at Chloride.——The Lucky Boy, Supt. F. W. Stull, is shipping ore.——Good ore is being taken out at the Mollie Gibson; Foreman Grant.——F. W. Theis has bonded the Silver Age.——H. N. Botsford, in charge of the erection of the Tennessee mill, Kingman, says it will run next month.

PINAL COUNTY.

A vein of black oxide of copper ore 2 feet wide is reported opened on the Black Diamond, at Silver King; H. Lampker, owner.——The old Pinal Con. mines, near Florence, may be reopened.——Tunnel No. 2, on the Golden Quiver at Mineral Hill, now in over 100 feet, will be extended; sinking of the shaft on the Silverado will be continued.

SANTA CRUZ COUNTY.

The Bland, in the Santa Rita mountains, 10 miles west of Patagonia, is shipping ore.

YAVAPAI COUNTY.

Sinking on the Crown Point, near Prescott, will be resumed; a pump is going in, and water will soon be pumped out. The ore runs from $12 to $15 to the ton; A. O. Brodie, Supt.

The shaft on the Cypress, in Big Bug district, near Prescott, is down 225 feet; Mayer, Thornton & Kingsley, owners.——G. H. Swartz has sold his placer property, at Mayer, to M. Lester of Colorado for $10,000. Mr. Lester will put in new machinery.——Ore from the Jack Redding group, 4 miles south of Mayer, runs 24.10% copper, $2 gold and $2 silver to the ton.——The Mizona Mineral Co., B. Blanchard Supt., has sunk two 100-foot shafts on the Iron King, in Big Bug district.——The Red Rock, on Upper Big Bug, at Providence, is sold to Mr. Powers of Jerome, representing Boston men, for $125,000; property is equipped with 10-stamp mill, concentrating plant and pipe line.——The Keystone C. & G. M. Co. is taking out copper-sulphide ore from the 200-foot drift in the Keystone, at Gilbert; more men will be put on to build the new cut-off road, which will save 2 miles of hauling.——The Mizona Mineral Co. has sold to New York men the Scoyoc and Gold Van mining claims, in Big Bug district, for $27,000.

CALIFORNIA.

ALAMEDA COUNTY.

The Justinian Caire Co. of San Francisco will work the Merchant manganese and magnesite deposits near Livermore.

AMADOR COUNTY.

A new tunnel is being run on the Madrone at Golden.——The Deadsheep will resume operations early this spring.——On the Modoc a new tunnel is run, tapping a 3-foot ledge of good milling ore.——Work on the Defender is progressing; the ledge at the 300-foot level is from 7 to 10 feet wide; about one-half of ore mined is shipping ore, while balance is milled on the ground; product of the mill exceeds all expenses.

CALAVERAS COUNTY.

On Six Mile creek, near Angels, Richmond & Shepherd are developing a new quartz lode.

CONTRA COSTA COUNTY.

The General Gleaves Oil Co. has its rig in place and will begin drilling soon.

EL DORADO COUNTY.

The mineral products of the county are gold and silver, lime, stone and slate. The total value of the mineral products of this county for the three years ending December, 1899, was $1,622,958. Of this sum the value of the gold product was $1,581,089. In the spring of 1900 there were twenty quartz mines, two drift mines and one copper mine in operation, also thirteen mills and one cyanide plant.

The St. Clair, at Kelsey, is running.

The German, at Placerville, will be reopened.

The Superior Court has confirmed the sale of the interest of the Melton estate in the Gentle Annie mine and other mineral properties to Thomas Clark for $55,000.

FRESNO COUNTY.

The mineral products of the county are gold and silver, copper, petroleum, gypsum, brick and mineral water. The total value of the mineral products for the three years ending December, 1899, was $812,625. The gold and copper mines are in the eastern portion of the county, which extends into the Sierra Nevada mountains. In March, 1900, there were five gold and four copper mines in operation and numerous other claims on which assessment work was being done. The petroleum industry is the most important mineral industry in the county. The oil fields are situated in the foothills of that portion of the Coast Ranges which is situated in the western borders of the county. In September, 1900, there were eight companies producing oil in the county, and many prospect wells were being drilled. The value of the petroleum product of the county for the three years ending December, 1899, was $664,212.

KERN COUNTY.

The mineral products of the county are gold and silver, borax, antimony, Fuller's earth, asphaltum, petroleum, coal, lime and brick. The total value of the mineral products of the county for the three years ending December, 1899, was $3,088,543, and of this amount the value of the gold product was $2,635,657. The mineral deposits of the county are distributed not only throughout the crystalline rocks of the higher mountains, but also through the sedimentary formations which form the foothills bordering the valley lands. The mineral deposits of the crystalline rocks are represented by the gold mines of the Kern river basin and of the Caliente district in that portion of the Sierra Nevada mountains which lies to the north of Tehachapi, and by the mines of Randsburg district, which lies to the south of that range. Some good prospects have also been discovered near Rosamond, a short distance from the southern boundary line of the county. There are also deposits of antimony and copper. The mineral deposits of the sedimentary rocks are those of petroleum which have been discovered in the Tertiary rocks forming the foothills on both sides of the San Joaquin valley. Indeed, these discoveries may be said to be the most important events in the mining history of California for the years 1899–1900. During the past five years the most important feature in gold mining in the county has been the growth and development of the Randsburg district, although there has of late been an increased activity among the mines of older districts which had previously been idle for many years. The deposits of petroleum before referred to are those of the Kern river district, on the eastern side, and of the McKittrick and Sunset districts on the western side of the San Joaquin valley.

A 10-stamp mill may be put in on the Jennie B. in the Slate range, near Randsburg; Stanley & Hushfeld, owners.

The Peerless Oil Co., operating on 31, 28-28, 3 miles north of Bakersfield, is producing 1000 barrels oil per day; a 7⅝-inch pipe line, 1⅜ miles long, was recently put in to connect wells with the railway, and a 10,000-gallon storage reservoir is just completed; two drilling rigs are kept in operation constantly; the company reports a shortage of tank cars in the district generally.

LAKE COUNTY.

The mineral products of the county are quicksilver and mineral water. The total value of these products for the three years ending December, 1899, was $517,330. Of this sum the value of the output of quicksilver was $327,471.

LASSEN COUNTY.

The mineral products of the county are gold and silver, the total output of which during the three years ending December, 1899, had a value of $116,608.

LOS ANGELES COUNTY.

The mineral products of the county are gold, gypsum, infusorial earth, petroleum, building stone, brick, pottery and mineral water. The total value of these mineral products for the three years ending December, 1899, was $5,108,895. Of this sum the value of the petroleum output was $4,199,238. During the past three years the oil fields of the county have yielded more than half the entire petroleum output of the State of California. Gold mining has been carried on for many years in the county, but the output of precious metals has been small.

MADERA COUNTY.

The eastern portion of the county extends into the Sierra Nevada mountains, and is largely devoted to mining. The mineral products consist of gold and silver, copper, granite and brick. The total value of the mineral products of the county for the three years ending December, 1899, was $387,954. Of this sum the value of the output of gold was $254,605. Madera county is the second largest producer of granite in the State, the value of the total amount of granite produced during 1897–1898–1899 being $122,888. In 1900 there were twenty gold mines and one copper mine in operation, and there are a large number of mines on which assessment work is being done. Copper mining promises to be an important industry in the county, and a 100-ton smelter has been erected at Madera.

MARIPOSA COUNTY.

The mineral products of the county are gold and silver and slate. The value of these products for the three years ending December, 1899, was $1,355,134. Of this amount the value of the output of gold was $1,350,674. In August, 1900, there were ten quartz mines and one hydraulic mine in operation, also three stamp mills and one compressor plant.

MONO COUNTY.

The mineral products of the county are gold and silver, lead and lime. The total value of these products for the three years ending December, 1899, was $867,457, of which sum $1,663,187 represented the value of the output of gold. In June, 1900, there were thirteen gold mines and four cyanide plants in operation.

Power drills were recently put in at the Castle Peak mines, near Bodie; a strike was recently made in a crosscut being run; ledge opened up is 8 feet 2 inches wide, and ore is said to run about $30 to the ton; Supt. Kermeen.

MONTEREY COUNTY.

The minerals produced in the county during the three years ending December, 1899, were mineral waters, stone, brick and asphaltum. The total value of the products for the three years mentioned was $38,693. In 1900 there was considerable prospecting for petroleum, and some oil was struck in the Cholame valley. In the autumn of 1900 the coal mines in Stone's canyon, near the eastern line of the county, were reopened.

NAPA COUNTY.

A new quicksilver mine is reported discovered in the northern part of the county by D. H. Thorne. San Francisco capital is stated to have bonded the mine for $100,000.

The mineral products of the county are quicksilver, mineral water and magnesite. The total value of the mineral products of the county during the three years ending December, 1899, was $1,812,754. Of this sum the value of the output of quicksilver was $1,531,047. In the spring of 1900 there were four quicksilver mines in operation.

NEVADA COUNTY.

The mineral products of the county are gold and silver, copper, mineral paint and granite. The total value of these products for the three years ending December, 1899, was $6,200,069. Of this amount the value of the output of gold was $6,074,389. In April, 1900, there were about seventy active mines, twenty-three stamp mills, one combined smelter and chlorination plant, twenty-nine concentrators, two chlorination works, one canvas plant, one slimes plant, one Huntington mill, six compressed air plants. Nevada county is the leading gold and silver producer in the State, and in the past three years has produced considerable copper.

In the Posie, near Willow Valley, a tunnel is being run to tap the pay shoot, which some time ago yielded ore running $65 per ton.

At Grass Valley 8000 feet of pipe line for the Empire M. Co. is laid.

The shaft at the Coe is repaired and work resumed.

Good ore is being taken out at the old Nevada, near the suspension bridge, at Nevada City; an incline shaft is being sunk.

PLACER COUNTY.

The mineral products of the county are gold and silver, granite and pottery clay. The total value of the minerals for the three years ending December, 1899, was $4,291,974, of which sum the value of the gold output was $4,113,044. The forthcoming report shows twenty-two mines and about fifteen granite quarries in active operation. There are four stamp mills.

The Valley View, at Mt. Pleasant, is closed down temporarily.

PLUMAS COUNTY.

The mineral products of the county are gold and silver, the output of which during the three years ending December, 1899, was $1,090,728. In May, 1900, there were in operation twenty-seven quartz, nine drift, six placer, four hydraulic and two copper mines.

RIVERSIDE COUNTY.

The mineral products of the county are gold and silver, mineral paint, asbestos, quartz sand, coal, salt, pottery, brick, granite and lime. The total value of these products during the three years ending December, 1899, was $707,892. Of this sum the value of the gold output was $499,425. In the spring of 1900 there were nineteen mines on which more or less work was being done, several of which were in active and continuous operation.

SACRAMENTO COUNTY.

The mineral products of the county are gold, granite, natural gas, macadam, paving blocks, marble, brick and pottery. The total value of these products for the three years ending December, 1899, was $566,856. Of this amount the value of the gold product was $266,257. The gold mines are in the vicinity of Folsom, where there were more than nine placer and drift mines in operation in September, 1900. The granite quarries are at Folsom Prison.

SAN BENITO COUNTY.

The mineral products of the county are quicksilver, mineral water, gypsum, oil, asphaltum, lime, macadam and coal. The total value of these products for the three years ending December, 1899, was $661,503. Of this amount the value of the quicksilver output was $570,185. In 1900 several new quicksilver mines and one copper mine were opened. In September of that year more than twenty companies were prospecting for petroleum, with satisfactory results.

SAN BERNARDINO COUNTY.

The mineral products of the county are gold and silver, copper, borax, cement, lime, brick, granite, stone, paving blocks and marble. The value of the total product of these minerals for the three years ending December, 1899, was $4,816,283. Of this amount the value of the output of borax was $3,306,000 and of the output of gold $526,484. In April, 1900, there were thirty-seven quartz, five copper and five borax mines in operation.

At Copper Camp, 18 miles from Manvel, J. M. Kennedy is opening up properties for Salt Lake, Utah, parties.——The Kemple & Thomas mines, near Sandy, are shipping silver and lead ore.——A tunnel is being run on the Tam O'Shanter (silver-lead).——On the Green Mountain group (copper and silver-lead), belonging to the Hearst Estate, a depth of 200 feet is attained. Drifts show copper ore bodies; Supt., F. O. Wilkinson.——The Potosi mines (silver-lead), recently incorporated at Los Angeles, are about 60 miles from Manvel.——J. B. Osborn, operating the Gun Sight, is shipping ore regularly. The ore is said to run 30% lead and from 30 to 50 ounces silver to the ton, it being hauled 100 miles.

SAN DIEGO COUNTY.

The mineral products of the county are gold and silver, lead, copper, salt, lithia mica, granite, rubble rock and mineral water. The total value of these products for the three years ending December, 1899, was $1,702,201. Of this amount the value of the output of gold was $1,599,174. In the spring of 1900 there were twenty-two quartz mines, at which work was more or less actively prosecuted, and one copper mine had been opened.

I. Trumbo reports 140 stamps dropping at the Gold Crown, at Hedges; 300 tons of tailings daily are being treated by the cyanide plant; preparations are being made for the use of oil as fuel at the mine; prospecting for the copper-bearing zone is in progress and the latter is expected to be reached at a depth of about 1500 feet.

SAN JOAQUIN COUNTY.

The mineral products of the county are natural gas, brick and manganese. The total value of these products for the three years ending December, 1899, was $282,580. Of this amount the value of the output of natural gas was $199,580. In January, 1900, there were ten productive gas wells in the city of Stockton.

SAN LUIS OBISPO COUNTY.

The mineral products of the county are gold, quicksilver, copper, bituminous rock, asphaltum, granite, rubble rock, marble, brick and mineral water. The total value of these products for the three years ending December, 1899, was $180,831. In

August, 1900, there were four quicksilver mines in operation, and several companies were prospecting for oil, but no remunerative wells had been obtained.

SANTA BARBARA COUNTY.

In the suit of the San Francisco Savings Union, plaintiff, against the R. G. R. Petroleum & M. Co., defendant, Judge W. S. Day, in the Superior Court of the county, renders decision in favor of plaintiff; the issue was whether property abutting upon an ocean frontage controlled such frontage, including the tide water and the ocean bed beyond. The plaintiff owns a piece of land at Ortega Hill, just west of the main oil field at Summerland. This property runs down to high water mark. The defendants put up a platform off the property and proposed to erect a wharf for oil purposes, claiming to hold under rights given by the Secretary of War. The plaintiff asked an injunction against further operations.

The mineral products of the county are gold, asphaltum, natural gas, brick and mineral water. The total value of these products for the three years ending December, 1899, was $1,272,694. Of this amount the value of the output of asphaltum was $790,560 and of the oil output $433,973. In June, 1900, practically all the productive oil wells were at Summerland. The asphaltum is obtained from the mines owned and controlled by the Alcatraz Asphalt Refining Co. and from the Goleta asphalt mine, owned by J. F. Moore.

SANTA CLARA COUNTY.

The mineral products of the county are quicksilver, mineral water, oil, asphaltum, brick, limestone, macadam, manganese, magnesite and pottery. The total value of the mineral products for the three years ending December, 1899, was $1,028,588. Of this amount the value of the quicksilver output (all from Almaden mine) was $590,470 and of the brick output $340,945. The oil fields of the county are situated in its western borders.

SANTA CRUZ COUNTY.

The mineral products of the county are lime, bituminous rock, limestone, sandstone, macadam, gold and granite. The total value of the mineral output for the three years ending December, 1899, was $764,969. Santa Cruz county produces nearly, if not quite, as much lime as is produced in all the other counties of the State and leads in the production of bituminous rock. During the first half of 1900 there was some prospecting for oil in the northeastern part of the county.

SHASTA COUNTY.

The mineral products of the county are copper, gold and silver, structural material and mineral waters. The total value of these products for the three years ending December, 1899, was $8,861,448. Of this sum the value of the copper output was $6,030,853 and of the gold output $2,302,970. In 1897, Shasta county advanced to the position of the leading mineral producer of the State, and in 1898 and 1899 not only maintained, but largely increased its lead. Until 1897 the chief mineral products of the county were gold and silver; in that year copper was added, and to the production of that metal the increasing of the total output was chiefly due.

The Snow Cloud, Desert Crescent, and Desert Jumbo mines, etc., near Cottonwood, containing five acres with water rights, are reported sold to Dafflemeyer & Stewart for $4000.

The new DeLamar smelter at DeLamar is about ready; it is estimated that a charge of ore can be roasted in twelve days; after first charge is drawn the smelting furnace will be blown in; men are now taking out iron and lime for fluxing purposes near the mouth of the McCloud, on Pit river; a 4-mile road is built, connecting with the Copper City road at the Silverthorn ferry; it is probable the company will build a railroad to connect with the main line during the present year.——It is reported that the Bully Hill management contemplate increasing smelting capacity to 500 tons daily.——The Michigan group, on Bully Hill, adjoining the DeLamar, may soon become the property of Capt. DeLamar.——On the Sybil, near French Gulch, a 700-foot crosscut tunnel has cut three veins, all showing good ore; a recent shipment of ore returned $300 to the ton; G. A. Von Krunze, W. B. Murdock and A. Rossi, owners.——The Midas, in Harrison gulch, was closed down recently owing to a heavy storm; it is estimated that the January output in consequence is cut down about $10,000; ordinary monthly output is $40,000.——Work on the Three Sisters, near French Gulch, recently bonded to San Francisco men, will probably be started up soon.

E. D. Blowers, J. A. Drennan and E. J. Stusse have bonded to J. De Lamar the Hotchkiss, Shadyside, Sunnyside and Lydia mining properties in the Pittsburg mining district for $11,000—the first payment, $5000, to be made November 23rd, the necessary assessment work to be done by the bondee during the life of the bond.

SIERRA COUNTY.

The mineral products of the county are gold and silver. The total value of the output of these products for the three years ending December, 1899, was $1,220,310, and of this amount the value of the gold output was $1,219,386. In July, 1900, there were in the county forty-five quartz, twenty-two placer, eighteen drift and ten hydraulic mines, most of which were in active operation.

SISKIYOU COUNTY.

The mineral products of the county embrace gold, silver, copper, mercury, chromic iron and building material, the chief industry of the county being gold and silver mining. The total value of these products for the three years ending December, 1899, was $2,603,153. Of this sum the value of the gold output was $2,602,698.

At the Gold Ball, in Salmon River district, fifty men are working; the 20-stamp mill is running; owners expect to crush 6000 tons of ore this season.——The Gold Run, A. Dannenbrink Supt., is handling twenty tons of ore per day; twenty men are employed. —— Ore from the Polar Bear, near Callahans, is said to run 20% copper to the ton.——An 8-foot vein of high-grade copper ore is opened up on the Bunting, of the Bunting Copper M. Co. ——The snow fall in this county so far this winter is unprecedented; it has reached 4 feet on the level, while mountain points report a fall from 12 to 20 feet in depth.

Stallcup Bros. are making preparations to put in hydraulic pipes at Henley to work their property with giants; they have an abundance of water.

J. O. Welsh of Mott is putting up a 10-stamp quartz mill on French creek, Scott valley.

SONOMA COUNTY.

The mineral products of the county are quicksilver, magnesite, mineral paint, mineral water, macadam, paving blocks, granite and rubble rock. The total value of these products during 1897, 1898 and 1899 was $395,836. Of this sum the value of the quicksilver output was $228,980. In the spring of 1900 there were three quicksilver mines in active operation.

TRINITY COUNTY.

The mineral products of the county are gold and silver, quicksilver and granite. The total value of these products for the three years ending December, 1899, was $2,834,325. Of this sum the value of the gold output was $2,528,137; of the quicksilver output, $304,154. In point of numbers the placer, hydraulic and drift mines of the county far exceed the quartz mines, but in the past three or four years there has been increased development of quartz mines and several have proved very remunerative.

The Zoellner, 6 miles northwest of Lewiston, is bonded to San Francisco men.——The Union Mutual M. Co., capital $750,000, is organized to work the mine.

TULARE COUNTY.

The mineral products of the county are gold and silver, copper, chrysoprase, granite, lime and brick. The value of these products for the three years ending December, 1899. was $59,254, the value of the gold being $38,840. In February, 1900, there were eight gold and three copper mines, at which more or less work was being done.

TUOLUMNE COUNTY.

The mineral products of the county are gold and silver and brick. The total value of the output of these products for the three years ending December, 1899, was $5,219,883, the value of the gold output being $5,180,294. In August, 1900, there were twenty-two mines in operation, eighteen stamp mills, three electric plants, three chlorination works, five cyanide plants, two slimes plants, four compressor plants; estimated number of men engaged in active mining, about 1100.

The Collier stamp mill, in Collierville district, is running on ore which assays $100 to the ton, and the supply of which is said to be large.

Sufficient ore is being mined at the Grizzly, Sonora, to keep the mill running one shift each day.—— The Hopeton is unwatered and work on the upraise is in progress.——At the Ribbon Rock the 10-stamp mill is running; the shaft is down 250 feet.

The Street, at Tuttletown, owned by F. Sutton, is bonded to R. Kinsman and others of Oakland; mine is being unwatered.——The Longfellow, at Big Oak Flat, continues shipping ore; ten stamps will be added to the mill.——The mill on the Hope is again in operation.——Ore running from $100 to $150 per ton is reported at a depth of 320 feet in the Goldwin; Supt. W. H. McClintock.

This week the first carload of granite ever shipped from the county went over the Sierra Railroad line. Twenty-five tons from a quarry near Soulsbyville were consigned to A. H. MacNutt, Pres. California Marble, Granite & Sandstone Dealers' Association at San Francisco.

VENTURA COUNTY.

The mineral products of the county are gold, borax, petroleum, asphaltum and brick. The total value of these products for the three years ending December, 1899, was $1,635,795. Of this sum the value of the petroleum output was $1,435,482. In June, 1900, there were about 206 productive wells in the county, and numerous prospect wells were being drilled. In 1898 valuable deposits of borate of lime were discovered in Lockwood valley in the eastern borders of the county.

YUBA COUNTY.

The mineral products of the county are gold and silver. The value of these products for the three years ending December, 1899, was $498,442. Of this amount the value of the output of gold was $498,430. In May, 1900, there were four quartz, two placer and one hydraulic mine in operation; dredge mining is also reported.

COLORADO.

BOULDER COUNTY.

Sinking is in progress on the Annie Loel at Ward.——A shaft is being sunk and a tunnel is being run on the Golden Fox.——The tunnel in the Baltimore Belle is being timbered. When completed the mine will be worked through this tunnel. ——The shaft on the Fourth of July at Eldora will be sunk to 260 feet.——The Shannahan coal mine, near Boulder, owned and operated by H. Linkletter, is running steadily. By a continuance of operations during the coal strike, it has probably averted a coal famine in and around Boulder.

CHAFFEE COUNTY.

Driving of No. 2 tunnel on the Tasmania at Winfield is in progress.——On the Vindicator No. 1 H. Munro is opening up pockets of good ore.

CLEAR CREEK COUNTY.

The Georgetown M., T. & T. Co. is incorporated, with $500,000,000 capital; D. B. Ellis, T. Holland, B. F. Kelly.——The Empire T. & G. M. & M. Co. is incorporated; F. A. Maxwell, F. P. Dewey, V. G. Hamill.

The air receiver at the Mayflower, Idaho Springs, exploded recently. A new one was put in immediately. The tunnel is being driven. The ore body is found to be steadily widening.

EL PASO COUNTY.

The new chlorination plant at Colorado City, costing $750,000, is ready to reduce ores.

GILPIN COUNTY.

The Gold Dollar, at Central City, is closed down, owing to a scarcity of coal.

HINSDALE COUNTY.

At Lake City the Golden Fleece tunnel is in 2200 feet.

LAS ANIMAS COUNTY.

The Red River Copper Co. has started operations on its property near Trinidad.

SAN JUAN COUNTY.

The 200-foot tunnel on the Mayflower, in Burro gulch, near Gladstone, is in good ore. Noll & Berquist, owners, expect to put on ten men.——The Minnie Gulch M. & T. Co. is framing timbers for another ore-house which will go in at tunnel No. 2; eighty men are employed.——Ore hauling from the Henrietta to the smelter is suspended for the winter.——The tunnel on the Ninety-Six is in 356 feet, and the face shows improvement in the grade of ore. ——The crosscut tunnel being run to tap the La Plata mine will also tap the Tornado; the crosscut is in 350 feet.——Drifting is in progress in the lower workings of the Sioux M. Co.'s properties, at the mouth of Picayune gulch. A mill will probably be built on the property this summer; Manager Condit.

SAN MIGUEL COUNTY.

At Telluride work on the Meldrum tunnel will start February 1st.

TELLER COUNTY.

The Golden Cycle, at Cripple Creek, is producing 125 tons of ore per day.——The Amanda, at Windy Point, is equipped with an electric hoist.——The shaft on the Triumph, now down 310 feet, will be sunk an additional 100 feet.——The Mackin No. 2 lease on the Lucky Guss is making a regular production of fifty tons of ore per week; ore runs about $200 to the ton.——Stoping is under way in the fifth level of the Theresa, and shipments of from 150 to 200 tons of ore are being made monthly. ——A 550-foot crosscut will probably be run on the Mountain Beauty by Mackin & Co.——A station is being cut on the 900-foot level of the Vindicator; pumps will be lowered to that point, and sinking will be continued to the 1200-foot level; sinking is also in progress from the 400-foot station in shaft No. 2.——Potvin & Vaine, operating the Christmas, are making good-sized shipments of ore from that mine.——The Victor Leasing Co., operating the north end of the Theresa, is sending out screenings from the 100-foot level running $50 to the ton; work is started on the 150-foot level.——The King & Whiting lease on the Hull City placer recently shipped eighty-two tons of screenings and twenty tons of rock; ore is said to average $40 to the ton.——Spellman, Berry & Co., operating the north end of the Blue Bird, on Bull Hill, are shipping ore that runs two ounces in gold to the ton.——A strike of good ore is reported made on the 400-foot level of the Kittie M , operated by the Kittie M. Leasing Co.; ore body is said to be over 3 feet wide, and assays run $70 the ton.——The Porter lease on the main workings of the Lucky Guss, on Bull Hill, is bought by the Stratton Cripple Creek M. & D. Co.——Holbrook, Williams & Co., leasing block No. 1 of the Trail, are drifting southeast through a phonolite dyke on the 170-foot level.

The Warren Leasing Co. has suspended operations on the Monument–Dillon, at Victor, temporarily.——Sinking of the Kellum shaft on the Anna Belle, on Galena hill, is under way; new plant works satisfactorily; shaft, now a little over 83 feet deep, will be continued to the 110-foot level, where drifting will be started.——Ore from the 550-foot level of the Pointer recently returned $604 to the ton.——Winchester & Stevenson, who have leased the Rhinoceros and Nil Desperandum claims of the Gould Co., on Raven hill, are sinking a 1000-foot three-compartment shaft; C. M. Crowber, Supt.——The Bonanza Leasing Co., operating the Kentucky Belle, on east slope of Raven hill, is running north and south drifts on the vein in the 125-foot and 200-foot levels.

Ore running over $100 to the ton is reported in the upraise from the tunnel level of the Galena, on Red mountain, near Cripple Creek.——The Mabel M. is shipping ore from the new strike recently made on the 355-foot level. A drift is being run on the vein.——The north block of the Little Joe is leased to J. F. Sanger for eighteen months.

IDAHO.

BLAINE COUNTY.

The Hattie 20-stamp mill that will go in at the Golden Star, near Hailey, will cost about $50,000, and it is expected to be ready for operations by June.

IDAHO COUNTY.

The shaft on the Buffalo Hump M. Co.'s property, at Buffalo, is down over 1600 feet.

LEMHI COUNTY.

At Salmon, the new shaft in the St. Joe, owned by the Franklin syndicate, has struck a vein at 75 feet of massive copper, granite and spathic iron.

SHOSHONE COUNTY.

At Delta the old pay streak on Trail gulch is found above Myrtle by J. Savage and others.

At Delta F. A. Knapp of the Silver Eagle M. Co. is arranging to drive 300 feet more tunnel. The members favor increasing the capital stock $100,000.——The permit system established by Gov. Steunenberg in 1899 is abolished by Gov. Hunt.

The output of the mines of the Cœur d'Alenes for 1900 is given as follows:

Bunker Hill	$1,750,000
Standard	1,600,000
Morning	1,600,000
Frisco	1,350,000
Tiger-Poorman	1,350,000
Empire State	1,250,000
Mammoth	1,000,000
Hunter	525,000
Hecla	500,000
Crown Point and Silver King	300,000
Sixteen-to-One	150,000
North Side (Gold Belt)	125,000
Total	$11,500,000

The Canyon Creek mines employed a monthly average of 1150 men; Wardner, 700 men; the two Mullan mines, 415 men; North Side gold mines, 50 men. Each man's pay at $3.50 per day would make their total daily earnings $8102.50. At least 400 more men are employed in developing new properties situated in the various sections of the district. Total shipments of crude ore and concentrates for the past year are said to be 175,000 tons.

MISSOURI.

JASPER COUNTY.

The Missouri & Kansas Zinc Miners' Association has contracted to ship 50,000 tons of high-grade zinc ore from the Missouri–Kansas zinc mining district to European smelters; it is said that there are 6000 tons of zinc ore now awaiting shipment; first cargo will go out in March.

MONTANA.

DEER LODGE COUNTY.

The Gladstone group, on Gold creek,

about 3 miles west of Pioneer, will be worked by the Gladstone M. Co., recently organized. Work will begin early in the spring, and a mill may be built during the summer.

Beginning Feb. 1st the eight-hour system of work will be put into operation in all the Anaconda properties. With a half hour for lunch, the men who go to work at 8 o'clock in the morning will quit at 4:30 in the afternoon.

FERGUS COUNTY.

A 100-ton per day mill is to go in on the Barnes-King group, in the North Moccasins, near Gilt Edge, this spring. The Great Northern M. & D. Co., Supt. E. W. King, will put in the mill and will develop the group mentioned.

GRANITE COUNTY.

The Dorothy M. Co. of New York is organized to work mines east of Granite. Work will begin early in the spring. A small mill will go in first, but if developments prove successful a larger one will go in.

LEWIS AND CLARKE COUNTY.

The new Sadtler zinc smelting plant, which will be built near Helena, will give employment to 500 men.

MADISON COUNTY.

Work on the new dredger of the Conrey Placer M. Co. at Virginia is under way. It will cost nearly $65,000.

At Pony the Conrey Placer M. Co. will begin work on the new dredger soon; overhauling the Gordon dredger is completed; J. Baier, General Manager.——McKinnon, Drake & Co. are running a tunnel to tap the shaft on the Galena, near Sterling. ——Foster Bros. have their timber for the new dredger which they will build at Laurin on the ground, and will go ahead. ——In Bridge canyon, C. Campbell is running a crosscut tunnel to tap the lead on the Bonanza.——Pritchett & Eastridge, operating the Keynote, in Georgia gulch, are shipping ore.——Wiseman & Townsend, working the Buckeye No. 2, at Brandon, are taking out ore.

PARK COUNTY.

The Robinson G. M. Co., capital $1,500,000, is incorporated at Livingston, to work the Revenue and Robinson claims at Jardine; twenty stamps are dropping at the Revenue mill on Revenue ore; men are also working on the Robinson.

SILVER BOW COUNTY.

A great percentage of the gold and silver production of Montana came from the copper ores of Butte—almost two-thirds of the silver and fully one-fourth of the gold. The balance is from smelting ores, mill bullion, cyanide vats and placer mines in other parts of the State.

SILVER BOW COUNTY.

Estimated mineral outputs of the mines at Butte for the year 1900 are given as follows:

Anaconda	$20,469,706
Boston & Montana	12,783,185
Butte & Boston	3,956,000
Montana Ore Purchasing Co.	3,404,000
Parrot Co	3,341,352
Colorado Co	3,075,000
W. A. Clark mines	2,472,000
Speculator mine	3,200,000
Washoe Co	667,932
Other mines	50,000
Total	$53,419,175

The Amalgamated Copper Co. has from the Northern Pacific R. R. an option on all the latter's timber lands in the State. The option runs three years and is at the rate of 50 cents per 1000 feet. The Amalgamated mines consume 100,000,000 feet of timber annually. The cost to the Amalgamated Co. will aggregate $6,000,000.

NEVADA.

STOREY COUNTY.

Repairs are made at the station on the 850-foot level of the Belcher, at Virginia.

A chute is going in on the third and fourth floors of the Con. Cal. & Va. at Virginia. The winze in the old north drift is down 33 feet. One of the air compressors is now being driven by a 100 H. P. electric motor.——The west drift on the 56-foot level in the Central tunnel of the Ophir is in 280 feet; face in quartz and porphyry.——The west crosscut on the Central tunnel level of the Mexican is in 273 feet.——At the Sierra Nevada the south drift on the 220-foot level is in 100 feet; face is in porphyry and quartz.——A 5 H. P. electric motor is in in the main west tunnel of the Chollar; it will run the blower. The main north drift on surface tunnel level is in 450 feet.——At the Potosi the north drift on the 80-foot level is run 210 feet.——Ore is being taken from the first, second and third floors of the 325-foot level of the Gould & Curry.——West crosscut No. 9, on the 425-foot level of the Best & Belcher, is run 143 feet.——At the Utah surface tunnel No. 2 is run 835 feet.

WHITE PINE COUNTY.

Supt. Marx of the Ely M. Co., at Ely, reports progress at the Chainman. The new mill is expected to be turning out bullion next month.

NEW MEXICO.

COLFAX COUNTY.

The Golden Era, near Elizabethtown, will put on more men at its mill.——The Gold & Copper Deep Tunnel M. & M. Co. in Elizabethtown will put a plant of machinery on the property in the spring.

OHIO.

WYANDOT COUNTY.

During 1900 thirty-three wells were completed in this county, the average daily production being fourteen barrels of oil to the well.

OREGON.

JACKSON COUNTY.

Operations at the Sterling, near Jacksonville, are resumed.——A clean-up of eighteen days' crushing by the 15-stamp mill, operated by the Victor, Jr., Co.'s (Greenback) mine in Grave Creek district, produced $21,000. About 100 men are employed there.

SOUTH DAKOTA.

CUSTER COUNTY.

C. H. Crabtree, Supt. Gladiator M. Co., recently bonded eleven mining claims near Custer City—the Gold Fish group; men will be put on and work pushed.

LAWRENCE COUNTY.

Twenty stamps are dropping at the Uncle Sam, at Perry.

UTAH.

BOX ELDER COUNTY.

The Henrietta M. Co., capital $25,000, is incorporated to work the Henrietta group, near Maple Springs.

GRAND COUNTY.

The smelter of the Coconino M. Co., A. Nebeker manager, continues closed down. It has been decided to erect a leaching plant.

IRON COUNTY.

At the Jumbo, Stateline, Supt. Menedue recently opened up ore in the winze running $62 to the ton.——It is said that the Ophir, at Stateline, will build an assay office.

Sinking is resumed on the Ophir at Stateline. The shaft, now down 300 feet, will go to the 500-foot level, at which depth crosscutting will be begun; F. M. Lathrop, manager.

JUAB COUNTY.

Thirty-six cars ore recently shipped from the Lower Mammoth at Tintic returned $117.71 net. The returns showed 10.8% copper, 40.4 ounces silver and 80 cents in gold to the ton.——Ore is opened up in crosscuts on the 600-foot level of the Little Chief at Eureka; Supt. J. Oberndorfer.

An upraise is being run on the Yankee Con. at Tintic; Manager R. Guenther.

SALT LAKE COUNTY.

At Bingham connection is made with No. 7 tunnel on the Highland Boy and the tramway is now taking out ore through that channel. Four hundred tons daily will be sent out at present. More will be shipped when the smelter is completed. Supt. of Construction Raht of the American Smelting & Refining Co. expects to have the new $1,000,000 smelter, now going in in Salt Lake valley, near Salt Lake, in operation this year.

The Rogers mill at Bingham will start. ——The Andy tunnel on the Parnall group (Highland Boy Con. Co.'s mines), now in about 300 feet, will be run an additional 200 feet; Supt. Smith.

The new mill on the property of the Butterfly M. Co. at Bingham was started up on the 22nd inst.——The main tunnel in the Alamo at Bingham is again in a body of copper, gold and silver-bearing sulphides; Manager J. T. Hodson.——The Dewey mill at Bingham is running on Northern Light ore.

TOOELE COUNTY.

J. J. Connor, operating the Nebraska group, near Stockton, has ore running $4 gold and seven ounces silver to the ton at a depth of 75 feet.——The shaft on the West Argent, down 640 feet, will be sunk to the 700-foot level.——Work is in progress on the Honerine and Hercules mines, near Stockton.——The Ophir at Ophir is still shipping ore. Heretofore the mine and mill have shut down with the advent of winter, but operations at both are now in full swing. Seventy tons of concentrates are turned out daily. It is reported that the mill will be enlarged to double its present capacity.

WASHINGTON.

FERRY COUNTY.

The Keystone G. M. Co., capital $50,000, is incorporated at Republic to work the Oversight and Ruby Fraction claims, near there.

OKANOGAN COUNTY.

The Okanogan Free G. M. Co., operating on the Similkameen river, in Palmer mountain district, near Loomis, has a 10-stamp mill on its property.

FOREIGN.

BRITISH COLUMBIA.

The iron mines of Texada island, owned by the Puget Sound Iron Works, have been transferred under lease to the Pittsburg Iron Works on a royalty basis.

The Sullivan group, near Kimberley, in East Kootenay district, has contracted with the Canadian Pacific R. R. Co., operating the Trail smelter, to ship its output during 1901 to the latter; shipments are being made; a spur from the siding at Kimberley to the mines will be built; Supt. C. H. Wolf.

The Kaslo Smelter, Ltd., is formed in Kaslo, to build a smelter and treat the wet ores of the Kootenays; capital stock, $600,000.——The shaft on the B. C., in Summit Camp, is down below the 400-foot level. One hundred and five men are working. Work on the Yellowstone, in Skylark Camp, is resumed.——Sixty-five men are now working on the properties of the Dominion Copper Co. at Phœnix.

During 1900 the St. Eugene at Moyie shipped 17,000 tons of ore, valued at $1,000,000. The payroll averaged $30,000 per month. The 400-ton per day concentrator is running steadily and regular shipments of concentrates to smelters in the United States and Chile are being made. Two hundred and seventy men are employed.

The Velvet, near Red Mountain, in the Trail Creek division, is shipping ore; the Great Northern Ry. Co. will probably build a line from Red Mountain to the Velvet.——The Giant, at Rossland, is shut down temporarily.——During week ending Jan. 19th the shipments of ore from the mines at Rossland were as follows:

	Tons.
Le Roi	2,683
Centre Star	2,160
War Eagle	630
Iron Mask	180
Le Roi No. 2	180
Giant	60
I. X. L.	23
Total	5,916

An 18-drill compressor is going in on the Velvet.——The new hoist at the Le Roi is about completed and sinking of shaft will probably be resumed soon; work on the foundations for a second hoist is progressing.——The shaft on the Rossland Great Western is down 720 feet.

During the past year the North Star, at Fort Steele, has paid three dividends, aggregating 12% of the capital stock.

The Sullivan produces about sixty tons of ore per day.——The Crow's Nest Coal Co. is taking out about 1300 tons of ore daily.——The mineral production of the mines of Southeast Kootenay for 1900 is estimated to be $2,384,534.

Since November, 1899, returns from ore crushed at the Granite mines at Ymir are given as $70,500. The bottom level is driven 540 feet on the vein. An incline shaft will be sunk on the vein to a depth of 300 feet, levels being run at 100, 200 and 300 feet. Twenty stamps will probably be added to the twenty now in use.——Senator Clark of Montana is reported to have made the first payment in the purchase of the big copper property on Howe sound, 18 miles from Vancouver, known as the Britannia claims, on which little development has been done. The price to be paid is $1,000,000.

MEXICO.

The Indianapolis-Sonora C. M. Co. will work on a large scale its properties in the Cananea mountains, Sonora.

The Mulatos G. M. Co., operating at Mulatos in the Sahuaripa district, Sonora, will soon put in six additional Bryan mills; its plant now consists of a battery of stamps, two Bryan mills, four concentrating tables and a twenty-five ton cyanide plant. Should development now going on prove satisfactory, a 250-ton cyanide plant will be built. At present ore is carried on mule-back to Torres, 125 miles, and from there hauled to Soyapa, 100 miles farther.

The Moctezuma Copper Co., operating reduction works at Placeritas, in Moctezuma district, Sonora, employs about 1000 men.——A railroad now being built to Placeritas is expected to be completed within a year.——Ores from the Pilares de Teras mines, in same district, are shipped to El Paso, Texas.——M. Harper is operating the Dos Cabezas and Monument mines, 20 miles east of Bacerac.——The El Carmen, 20 miles east of Oposura, and owned by D. B. Durazo, is producing high-grade silver ores, which are profitably worked by arrastra and the primitive type of smelter in use over a hundred years ago.——T. H. Boaz of Corralitos has redenounced the old Gabilan, near Tepachi, has sunk a shaft 80 feet and has drifted at that depth.——The Sonora Development Co. will begin work on its properties at Placeritas, Tepachi and Oposura.

NOVA SCOTIA.

The Colonial Co., operating at Renfrew, in a recent run of 110 tons, produced a retort selling for $54,000. There are about thirty mines in the Province that are regular producers and whose ore is milling about $9 per ton on the plates, besides producing some good concentrates.

THE KLONDIKE.

Men are engaged in quartz mining. Ore from four Bonanza creek groups assays $40 per ton gold.

Personal.

H. MOORE of Cripple Creek, Colo., is in Tintic, Utah.

F. CARRIGAN is foreman Blue Bell, Big Bug district, Prescott, Ariz.

J. S. MURPHY is appointed Supt. Colorado King, Cripple Creek, Colo.

A. W. HAVENS has returned to San Francisco from Virginia, Nevada.

A. W. MOUNTNEY is receiver for the Fortune M. & M. Co., Bingham, Utah.

GEN. J. M. GLEAVES has returned to San Francisco from Washington, D. C.

C. A. WACK is Asst. Supt. Treadwell & Mexican M. Co., Douglas island, Alaska.

H. J. BURTWELL, late of Inyo county, Cal., has taken residence in San Francisco.

THOS. G. HURLEY has been re-elected vice-president The Exploration Co. of New York.

W. S. HASKIN of British Columbia succeeds W. Sellkirk of the Iron Mountain at Keswick, Cal.

N. S. BERRY may succeed E. H. Cook as Supt. United Globe mines, Globe, Ariz., who lately resigned.

A. W. WARWICK, formerly of Danby, Cal., is now in charge of metallurgical matters at Leadville, Colo.

A. F. HOLDEN, managing director U. S. M. Co., Bingham, Utah, will arrive there from Europe March 1st.

C. L. MILLER, formerly Supt. Kate Hayes, Grass Valley, Cal., goes to the Klondike to superintend a mine there.

FOREMAN HUNTER AND MASTER MECHANIC BELL of the Treadwell mines, on Douglas island, Alaska, have resigned.

G. T. COFFEY of the San Juan Ridge, near Nevada City, Cal., goes to the Klondike to assume charge of a mine there.

J. NOONAN, Supt. Dos Cabezas Con. M. Co., Arizona, has resigned and is now in California. C. M. Roberts succeeds him.

PERCY R. STUART of the California Wire Works has returned to San Francisco from a business trip through Utah.

A. MELDRUM, manager Meldrum tunnel, between Ironton and Telluride, Colo., is at the latter place from Glasgow, Scotland.

FELIX CHAPPELLET JR. goes from Placer county, Cal., to superintend operations at the Santa Rosalia mine, Sonora, Mexico.

A. RAHT, Supt. of construction of the American Smelting & Refining Co., has returned to Salt Lake, Utah, from Mexico.

R. WINTERS, Supt. dredger, Idaho City, Idaho, has returned there from Boston, Mass.

C. D. MARX, professor of engineering at Stanford, Cal., University, is elected president of the Technical Society of the Pacific Coast.

W. F. ARAM has returned from Alameda, Cal., to the Magnet mine, which he is superintending at Gold, Madera county, Cal.

E. M. GRANT, head electrician of the Mountain Copper Co., Keswick, Cal., has resigned. J. Mackenzie of Portland, Or., succeeds him.

VICE-PRES. BARNEY and stockholders Sisson and Turmmins of the Troy Copper Co., of Troy, Ariz., have returned there from New York.

D. H. LAWRENCE, formerly Supt. Waldo C. S. Co., Waldo district, Oregon, is appointed Asst. Supt. of a London mining company at Sonora, Mexico.

W. W. THURSTON, Supt. Omaha Con., Lone Jack and Homeward Bound mines of Grass Valley, Cal., contemplates immediate departure for South Africa.

GEORGE P. LOW succeeds Dr. F. A. C. Perrine as local honorary secretary for the Pacific coast members of the American Institute of Electrical Engineers.

H. T. SCOTT has been re-elected president and treasurer Union Iron Works, San Francisco; Irving M. Scott, vice-president and general manager; J. O'B. Gunn, secretary; G. W. Dickie, manager.

Books Received.

"Engineering Chemistry," second edition, revised, 8vo., pp. 500, 132 illustrations; Thos. B. Stillman: A work worthy of commendation as of value to the analytical chemist, the chemical engineer, the metallurgist or mine manager; not too technical for daily use and sufficiently exact for the most delicate tests; a sort of connecting link between the college professor and the mine superintendent. The formulæ for determination of certain metals, the chapter on boiler scale, that on alloys and one on energy equivalents are particularly useful. Price $4.50. The Chemical Publishing Co., Easton, Pa.

"The Coal and Metal Miners' Pocket-book," sixth edition, enlarged and practically rewritten, 12mo.; pp. 637; illustrated; morocco; thin, tough paper; got up in about the same general way as the Kent or Haswell vade mecum; a wealth of matter of interest and value to mining engineers and superintendents, and well arranged. The chapters relating to coal mining contain much that is up-to-date; the glossary is unusually extended, containing nearly 2500 mining terms, and the whole is so indexed as to make its contents readily accessible. Price $3. The Colliery Engineer Co., Scranton, Pa.

"Modern Ore Concentration and Mill Practice": This is a little treatise issued by the Colorado Iron Works Co., Denver, Colo., so full of sensible statement and information, the result of experience, as to justify notice in this column. Among other things, it says what this paper has so persistently maintained, viz: that "concentration is a fine art, and needs as much skill as the business of smelting and refining ores." Incidentally, the Denver concern advertises its special make of concentrator. Anyone at all interested in concentration will find matter of interest in the booklet, which will be sent free of charge anywhere on application to the Colorado Iron Works Co., Denver, Colo.

Equally deserving of similar notice is the 1901 edition of the Risdon Iron Works' treatise on "Gold Dredging Machinery." This is the fourth edition of this little work. It contains data concerning costs of operating gold dredgers from actual working experience therewith, abundantly illustrated; issued by the Risdon Iron Works Co., San Francisco, Cal.

"The Copper Handbook," 8vo., pp. 328, a compendium of historical, statistical and descriptive information regarding Lake Superior copper companies; price, $1; compiled and published by H. J. Stevens, Houghton, Mich.

Obituary.

ELISHA GRAY, by many considered to have been the real inventor of the telephone, died suddenly at Newtonville, Mass., on the 21st inst. He was foremost among electricians and inventors, and will live in history as one of the men of the nineteenth century who aided greatly in the world's advancement.

Commercial Paragraphs.

THE New York office of the Viennot Advertising Agency has been moved from 127 Duane St. to Room 719, Temple Court Building, Nassau St.

W. H. STROUT & SON have purchased the assay and laboratory equipment of F. M. Benedict in Cripple Creek, Colo., and have taken possession, discontinuing their Denver office.

THE Jeanesville Iron Works Co. have a contract with the Montana Ore Purchasing Co., Butte, Mont., for three compound condensing mine pumps, with condensers, and with the Butte & Boston Con. Co. for one triple expansion pump, capacity 1,000,000 tons per day, 1400 feet lift, also one for 600 feet lift.

NOCK & GARSIDE, Denver, Colo., manufacturers of special types of elevators for buildings, recently put in some of their equipment at the shop of the Gardner drill, Denver; the Chicago Pneumatic Tool Co.'s Denver shops; the Rocky Mountain smelter, and the Union Gold Extraction Co. at Florence, Colo.

THE Wetherell magnetic separator has been in use for several months at the ore testing works of Henry E. Wood, Denver, Colo., during which numerous tests have been made on Leadville zinc ores. It is reported very effective work has been done in the way of separating the zinc from the pyritic and oxidized iron product. Mr. Wood's plant is equipped for practically all metallurgical and mechanical tests and within the past year he has received ores from nearly all parts of the world.

A FIRM conveniently located to northern California mining districts, and prepared to handle any class of electrical repairs on short notice, is the Electrical Construction Co. of Sacramento, of which O. A. Hoit is manager. They are agents for the Wagner Electric Manufacturing Co. of St. Louis, Mo., and have facilities for installing generating plants and power plants, telephone lines, etc. Mr. Hoit is also principal of the Sacramento manual training school of mechanical and electrical engineering, and would be pleased to answer any inquiries in regard to the business or to send a prospectus of the school.

Recently Declared Mining Dividends.

	Payable.
Gold Coin M. Co., Colo., 3 cents per share, $30,000	Jan. 15
Boston & Montana M. Co., Mont., regular $5 per share, extra $5 per share, $1,500,000	Jan. 25
Con. G. M. Co., Colorado, 1 cent per share, $10,000	Jan. 25
Bull Hill Con. M. Co., Colorado, 1 cent per share, $15,000	Jan. 25
Modoc M. Co., Colorado, 1 cent per share, $5000	Jan. 15
Standard Con. M. Co., California, 10 cents per share, $20,000	Jan. 26

Notices of Recent Patents.

Among the patents recently obtained through Dewey, Strong & Co.'s SCIENTIFIC PRESS U. S. and Foreign Patent Agency, the following are worthy of special mention:

SLIDABLE AND SWINGING WINDOW SASHES.—No. 666,053. January 15, 1901. Bernard Hausmann, San Francisco, Cal. This invention relates to a mechanism for sliding window sashes and means for disengaging such sashes from suspending cords on one side, so that they are turnable about hinges on the other side to swing inwardly, for the purpose of obtaining access to the outside of the sash and for other reasons. It consists in a novel construction of the hinges, the slidable parts in connection with which the sash moves up and down, a means for holding the sash in place when disengaged from the cord of the opposite counterbalance weight, and a means for attaching and securing said cord so as to hold it, and weights attached thereto in place while the sash opens about its hinges.

BALL CASTER.—No. 666,009. January 15, 1901. M. C. Hall, Bakersfield, Cal. The object of this invention is to provide a caster for furniture and like articles. It consists of a large ball adapted to form contact with the floor or other surface, this ball being contained in an exterior casing, within which are smaller balls which form a bearing for the larger one. These sets of small balls are turnable upon bearing rings or surfaces, and thus allow the main large ball to revolve freely in any direction.

List of U. S. Patents for Pacific Coast Inventors.

REPORTED BY DEWEY, STRONG & CO., PIONEER PATENT SOLICITORS FOR PACIFIC COAST.

FOR THE WEEK ENDING JAN. 15, 1901.

666,002.—CONCENTRATING TABLE—W. G. Dodd, S. F.
666,247.—MUSICAL SCALE APPARATUS—R. L. Fraisher, Glendora, Cal.
666,049.—SACK JOLTER—M. A. Gifford, Grafton, Cal.
666,245.—VALVE—H. G. Ginaca, S. F.
666,009.—BALL CASTER—M. C. Hall, Bakersfield, Cal.
665,901.—DOOR STOP—E. B. Hampton, Napa, Cal.
666,053.—SWINGING WINDOW—B. Hausmann, S. F.
666,232.—BOX STRAPPING MACHINE—Levy & Little, S. F.
666,023. — CENTRIFUGAL PUMP — H. Perry, S. F.
666,208.—GAS GENERATOR—J. W. Reeder, Goldendale, Wash.
666,068.—BICYCLE BRAKE—E. Sarvela, Whitesborough, Cal.
666,212.—MOLE TRAP—A. B. Simmons, Calistoga, Cal.

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Latest Market Reports.

SAN FRANCISCO, Jan. 24, 1901.

SILVER—Per oz., Troy: London, 28⅝d (standard ounce, 925 fine); New York, bar silver, 62c (1000 fine); San Francisco, 62c; Mexican dollars, 50c.

COPPER.—New York: Lake, 1 to 3 casks, $17.00 cash; carload lots, 16.75; Electrolytic, 1 to 3 casks, 16.75; carload lots, 16.50; Casting, 1 to 3 casks, 16.50; carload lots, 16.37½. San Francisco: 18. Mill copper plates, 20c; bars, 22@23c.

LEAD.—New York, $4.37½; Salt Lake City, $4.00; St. Louis, $4.20; Missouri lead, $4.32½ desilverized lead; San Francisco $5.00, carload lots; 5½c 1000 to 4000 lbs.; pipe 6¾, sheet 7½, bar 6c; pig, $4.70 @5.10. London, £16 1s 3d per ton.

SPELTER. — New York, $4.15; St. Louis, $3.95; London, £19 per ton; San Francisco, ton lots, 5½c; 100-lb lots, 6c.

ANTIMONY.—New York, Cookson's, 10c; Hallett's, 9½c; San Francisco, 1000-lb lots, 12c; 300 to 500 lbs., 13@14c; 100-lb lots, 15@18c.

IRON.—Pittsburg, Bessemer pig, $13.40; gray forge, $13.50; San Francisco, bar, per lb., 2.65c in small quantities.

STEEL.—Bessemer billets, Pittsburg, $19.75; open hearth billets, $21.00; San Francisco, bar, 7c to 12c per lb.

TIN.—New York, pig, $27.00; San Francisco, ton lots, 29c; 1000 lbs., 29½c; 500 lbs., 29¾c; less, 30c; bar tin, ℔ lb., 35c.

QUICKSILVER. — New York, $52.00; London, £9 2s 6d; San Francisco, local, $48.50 ℔ flask of 76½ lbs.; Export, $45.

NICKEL.—New York, 50@60c ℔ lb.

MAGNESIUM.—New York, $3.00 ℔ lb.; San Francisco, $4.00.

ZINC.—San Francisco, 5½c; slab, 5¾c; bar, 7c.

BABBITT METAL.— San Francisco, No. 1, 10c.

SOLDER. — Half-and-half, 100-lb. lots, 18½c; San Francisco, Plumbers', 100-lb. lots, 15½c.

ASSAY LITHARGE.—San Francisco, 10c ℔ lb, small lots.

BISMUTH.—New York, ℔ lb., $2.25 50-lb lots; San Francisco, $2.50 to $2.75 lb lots.

PLATINUM.—San Francisco, crude, $17 ℔ oz.; New York, $18.20 per Troy oz

ALUMINUM.—New York, No. 1, 99% pure ingots, 35c; No. 2, 90%, 30c to 35c.

FERRO-MANGANESE. — Pittsburg, 80%, domestic, $62.50, large lots.

PHOSPHORUS.—F. o. b. New York 50@60c ℔ lb.

POWDER.—F. o. b. San Francisco: No 1. 70% nitro-glycerine, per lb., in carload lots, 15½c; less than one ton, 17½c. No. 1*, 60%, carload lots, 13½c; less than one ton, 15½c. No. 1** 50%, carload lots, 11¾c; less than one ton, 13¾c. No. 2, 40%, carload lots, 10c; less than one ton, 12c. No. 2* 35%, carload lots, 9½c; less than one ton, 11½c. No. 2** 30% carload lots, 9c; less than one ton, 11c. Black blasting powder in carload lots, minimum car 728 kegs, $1.50 per keg; less car lots, $2 per keg.

CAPS.—3x, $5.50 per 1000; 4x, $6.50; 5x, $8; Lion, $9, in lots not less than 1000.

FUSE.—Triple tape, $3.60 per 1000 feet; double tape, $3.00; single tape, $2.65; Hemp, $2.10; Cement No. 2, $3.00; Cement No. 1, $2.65, in lots of 3000 feet and up.

CANDLES.—Granite 6s, 16 oz., 40s., 11½c ℔ set; 14 oz., 40s., 10c.

CHEMICALS.—Cyanide of potassium, 98%-99%, jobbing, 32½@33½c ℔ lb.; carloads, 30@31c; in 10-lb. tins, 40c; sulphuric acid, in carboys, 66% B, 2c ℔ lb.; soda ash, $1.60 ℔ 100 lbs. 58%; hyposulphite of soda, 2¾@3c ℔ lb.; blue vitriol, 5½@6c ℔ lb.; borax, concentrated, 7@8c ℔ lb.; chlorate of potash, 12@13c; roll sulphur, 6c; alum, $1.90@2.00; flour sulphur, French, 2¼@2½c; California refined, 1¾ @ 2c; nitric acid, in carboys, 8c ℔ lb.; caustic soda, in drums, 3@4c ℔ lb.; Cal. s. soda, bbls., $1.00; sks, 95c ℔ 100 lbs.; chloride of lime, spot, $2.50@2.60; nitrate of potash, in kegs, 8c; caustic potash, 10c in 40-lb. tins.

TUNGSTEN.—New York, ℔ lb., 95c; San Francisco, $1.15.

FERRO-TUNGSTEN. — New York, 37%, 32c; San Francisco, 65c (60%).

Special Meeting of Stockholders.

Notice is hereby given that a special meeting of the stockholders of the RUBY GOLD GRAVEL MINING COMPANY will be held at the principal office of the Company, Room 24, 320 Sansome St., in the city of San Francisco, Cal., on TUESDAY, the 29th day of January, 1901, at 2 o'clock P. M., for the purpose of electing a Board of Directors and the transaction of such other business as may come before the meeting. JOSEPH H. MOOSER,
Secretary Ruby Gold Gravel Mining Company, 320 Sansome St., Room 24, San Francisco, Cal.

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SITUATIONS WANTED.

Experienced licensed land and mine surveyor, competent at assaying and report work, bookkeeping and photography, wishes a position for three months or less. Partial outfit. References exchanged. H. W. H. Penniman, Santa Cruz, Cal.

POSITION AS MILL MAN OR VANNER MAN, capable of taking charge of mill. Can give good references.
Address J. H.,
40 Pond Street, San Francisco, Cal.

ELECTRICIAN,
familiar with the repairing of electric mining machinery, desires position anywhere Speaks Spanish, German and English Address A. D., care of Mining and Scientific Press.

WANTED—A position as superintendent for a mining company by a man of 16 years' practical mining experience; understands mining and milling (amalgamation, concentration and leaching); good assayer and accountant; would accept a subordinate position if good; references. Address "Advertiser," 1225 Webster St., Oakland, Cal.

A position as superintendent or mining foreman by a man of 20 years' practical experience in mining in all its branches in the different mines in California and Mexico—gold, silver, copper and quicksilver mines. Have had the handling of large forces of men. Can speak Spanish. Can go through and secure any kind of ground. The best of references. D. E. F., care this office.

A sober, industrious young man, who is a competent assayer, surveyor, draughtsman and bookkeeper, wishes a situation. Has had eighteen months' practical experience and two years' technical training. Is willing to make himself generally useful about a mine. Salary reasonable; opportunity to show ability considered first. References. Address R. M., Mining and Scientific Press.

Experienced Metallurgist and Chemist of high standing, with first-class references, is open for immediate engagement as superintendent of a lead smelting or cyanide or chlorination plant, preferably located in California, Arizona, or Montana. Would be willing to accept moderate salary with small interest in plant or lease same. Address M. J. E., 1022 South 14th Street, Denver, Colorado.

CHEMIST AND ASSAYER, with experience in draughting, bookkeeping and typewriting, desires position as assayer or assayer and bookkeeper in mine or as secretary to mining engineer or mine official. Has fair literary and scientific education Experience in the preparation of reports, prospectuses and catalogues. Excellent moral character and good health. For further particulars, address E. K. M., care Mining and Scientific Press.

Situation Wanted by Mining Engineer of 20 years' experience in California, Colorado, Mexico and Germany. Has had charge of large properties—gold, silver, lead, copper, sulphur and oil. College graduate; good assayer, surveyor and accountant; speaks Spanish. Has experience in railroad construction and road building. Formerly U. S. deputy mineral surveyor and member of geological field force. Will go anywhere. Address P. M., Mining and Scientific Press.

Mining Accountant and Store Manager.

A young man of energy and ability, and thoroughly experienced in all details of mine accounting, store managing, buying, contracting, etc., is desirous of obtaining an opening. Is fully qualified to assume full charge of such work or to render general assistance Highest references will be furnished and satisfactory services guaranteed. Address B. P. O., this office.

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MINE PROMOTER WANTED
To influence capital in A1 developed gold mine near Buffalo Hump, Idaho. Address Mineral Recorder, Elk City, Idaho.

WANTED.
A Second-Hand Automatic Cut-Off Engine.
40 H. P. OR 45 H. P. IN GOOD ORDER.
Address MINING CO., Box 10, care of this office.

WANTED.
Assayer, Chemist and Surveyor,
with Surveying Instruments.
Must furnish good references as to character and ability and from previous positions Give age; experience. Single man preferred. Steady work. Wages $75 per month and board.
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Capitalists and wealthy syndicates desiring to purchase large operating gold and copper mines, at owners' bedrock prices, can most likely find what they want by corresponding directly with the undersigned. By so doing buyer and seller can be brought together without the intervention of useless and undesirable promoters, brokers and middlemen. E J. FRASER, 522-523 Parrott Building, San Francisco, Cal.

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Over 12 feet wide; values $5 to $30, gold and silver. Mine can be developed cheaply by tunnels to depth of 600 feet. Many improvements; 1500 feet work done; buildings up, and good road; timber and water Prospect for a big mine seldom equaled. Lease and bond on favorable terms. D. S. M., care this office.

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Developed Silver-Lead Mines and Prospects,
Parral and Santa Barbara Districts of Mexico.
The coming greatest camp in the Republic. Correspondence solicited
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1 4-drill Norwalk steam compressor, compound air cylinders.
1 6"x8" double engine, single reel hoist.
1 8"x10" double engine, double reel hoist.
1 double reel water or steam hoist.
Machinery all practically new. Convenient for inspection. Address "BARGAIN," P. O. Box P, Auburn, Cal.

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Two No. 10 Sturtevant Blowers; one 6-ft. American Exhaust Fan; two No. 10 Sturtevant Exhausters; one No. 6 Sturtevant Exhaust; twenty-five smaller Blowers and Exhaust Fans.
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THE S. H. SUPPLY CO.,
22nd and Larimer Sts., DENVER, COLO.

NOTICE OF AMENDMENT OF ARTICLES OF INCORPORATION.

Notice is hereby given that it is the intention of the JAMISON MINING COMPANY to amend its Articles of Incorporation by substituting for the second of said articles setting forth the purposes of the Corporation, which now reads:

"2nd. That the purposes for which it is formed are: The acquisition of quartz mines and gravel mines in the State of California, and to work the same for gold and silver; also, to acquire, hold and use water and water-rights and privileges in connection with such mining; also, to acquire, hold and use timber lands in connection with such mining," the following:

Second:—That the purposes for which it is formed are: To mine for, and mill and reduce ores of all kinds; to acquire by location, purchase or otherwise, to own, hold, work and operate mines in and throughout the State of California; to acquire by purchase or otherwise, to own, hold, develop, improve, lease, let, mortgage, grant, bargain, sell and convey mines, and mining claims and properties in the State of California; to acquire, by purchase or otherwise, to build, erect, construct, own, operate, lease, let, mortgage, grant, bargain, sell and convey mills, and other reduction and smelting works, for the milling and reduction and smelting of ores, and to deal in precious metals and minerals and the products of mines of every kind, and to transport and provide ways and means to transport the same to market, and to market and sell the same; to acquire, by purchase or otherwise, to improve, develop, own, hold, use, lease, let, mortgage, grant, bargain, sell and convey real property, lands, water, water-rights, privileges, and franchises of every kind, in and throughout the State of California; to buy, own, hold, sell and generally deal in goods, wares and merchandise, and all kinds of personal property, including the stocks of other corporations, also bonds, notes and personal securities of every kind. To establish and maintain agencies of said Corporation, and to appoint and employ agents, wherever it may be deemed best by said Company; and generally to do any and everything necessary, proper or expedient to carry out the aforesaid purposes and carry on the business of said Corporation.

NOTICE OF STOCKHOLDERS' MEETING.

A Special Meeting of the Stockholders of the JAMISON MINING COMPANY for the purpose of considering and acting upon the matter of Amending its Articles of Incorporation, as above provided, will be held at the office of the company, room 54, 120 Sutter street, San Francisco, California, at two o'clock P. M. on Monday, the 11th day of February, 1901.

By order of the Board at its meeting of December 31st, 1900. SAM W. CHEYNEY,
Secretary Jamison Mining Company.

Quicksilver
BY THE FLASK OR CARLOAD.
The Eureka Company,
OF SAN FRANCISCO.
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AUTOMATIC SAMPLING
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No Trouble to Save Money.
Generally, money is easier spent than saved.

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Can't we send one on approval at our expense? It will convince you.
THE BURT MFG. CO.,
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Largest Mfrs. of Oil Filters in the World.
We also make the BURT EXHAUST HEAD.

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Save 15 to 50 Per Cent on Your Water Pipe.
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SPOKANE, WASH.

WE DO Electrical Repairing,
INSTALL PLANTS, SELL WAGNER DYNAMOS AND MOTORS, CONSTRUCT LINES, Etc
We are Headquarters of the Sacramento Manual Training School of Mechanical and Electrical Engineering. Address
THE ELECTRICAL CONSTRUCTION CO.
825 J Street, SACRAMENTO, CAL.

THE COLORADO MIDLAND RAILWAY
reaches all the best mining towns in Colorado—Cripple Creek, Victor, Leadville, etc. It is the only line running Pullman Observation Cars daily through the mountains. Daily Standard Pullman to Denver and Weekly Tourist Car, personally conducted, San Francisco and Los Angeles to Chicago.
For further information, address
W. H. DAVENPORT, (or) W. F. BAILEY,
Gen'l Agt., San Francisco, Cal. Gen'l Pass. Agt. Denver, Colo.

THE CALIFORNIA DEBRIS COMMISSION HAVING received applications to mine by the hydraulic process from Peter H. Russell, in the Dad's Gulch Mine, near Camptonville, Yuba Co., to deposit tailings in Brandy Creek; from Wm. Abbott and Louis W. Clark, in the Gold Hill Placer Mine, near Rackerby, Yuba Co., to deposit tailings in a ravine below the mine; and from E. C. and P. J. Rigney, in the Maxey Mine, near Mountain Ranch, Calaveras Co., to deposit tailings in O'Neil's Creek, gives notice that a meeting will be held at Room 59, Flood Building, San Francisco, Cal., on February 11, 1901, at 1:30 P. M.

INVENTORS, Take Notice!
L. PETERSON, MODEL MAKER,
544A MISSION STREET, bet. First and Second Sts., SAN FRANCISCO. Experimental machinery and all kinds of models. Tin and brasswork. All communications *strictly confidential.*

FOR SALE.

C E ENGINEERS PURCHASING & FORWARDING AGENTS B Co.

Six FIVE FOOT Huntington Mills

TOGETHER WITH NECESSARY

CRUSHING AND POWER PLANT.

Will Be Sold as Separate Items or Entire Mill.

PRESENT LOCATION: NEAR DEADWOOD, SOUTH DAKOTA.

Used Less Than Three Months. Guaranteed in Splendid Condition.

WILL NAME PRICES F. O. B. DEADWOOD, CHICAGO, OR DELIVERED AS DESIRED.

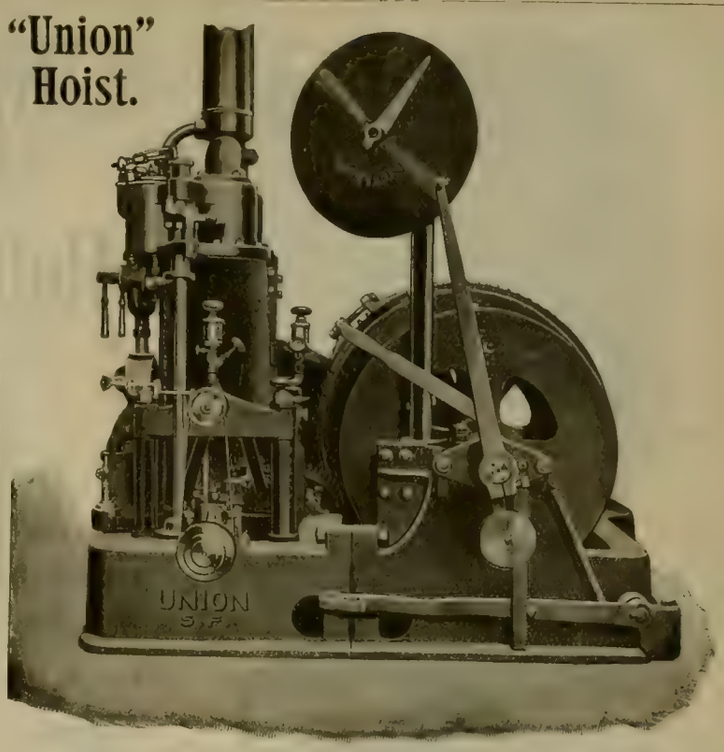
SPECIFICATIONS (Condensed).

6 ORE GATES, 24 x 38, rack, hand wheel, frames, bolts, complete.
2 ORE BINS, all necessary bolts, rods, nuts and washers.
2 GRIZZLEYS, 4′ x 10′, 1″ openings.
6 CHALLENGE AUTOMATIC ORE FEEDERS, including hoppers, wood frame, shafts and pulleys.
6 HUNTINGTON CENTRIFUGAL ROLLER MILLS, 5′ diameter, all fixtures and fittings, complete with wooden frame, shafts, pulleys and gearing.
6 COPPER TABLES, 6′ x 12′, ⅛″ copper, electroplated 1 oz. of silver per square foot.
2 AMALGAM SAFES.
1 BELT TIGHTENER, complete with pulley, boxes, etc., for main belt.
1 BELT TIGHTENER, complete with pulley, boxes, etc., for crusher.
1 CORLISS ENGINE, built by Fraser & Chalmers, cylinder 20″ diameter by 48″ stroke, complete in every particular, shaft 10″ in diameter, band flywheel 16′ diameter, 30″ face; weight, 42,000 pounds.
3 HORIZONTAL TUBULAR BOILERS, 54″ diameter, 16′ long, complete with steam drums 30″ x 72″, mud drums 18″ x 66″ for each boiler, breechings, smoke box, stack 48″ diameter 60′ long, all necessary guy rope, half arch fronts, grate bars, cast and wrought iron parts necessary for setting, feed, blow off check and safety valves, gauges and all fittings. Weight, 51,000 lbs. At present these boilers are arranged for setting in one battery. We will make any changes required, furnishing stacks and other items necessary to set each boiler separately.
1 HEATER, tubular, 30″ diameter, complete, with exhaust pipe.
2 NO. 5 KNOWLES BOILER FEED PUMPS.
1 BERRYMAN HEATER, 18″ diameter by 7′ long, copper tubes, 4″ pipe inlet and outlet.
1 HOOKER VERTICAL SINKING PUMP, 14x8x14, 6″ suction 5″ discharge.
8 ORE CARS, one ton capacity each.
1 WATER WHEEL, 50 H. P.
1 16″ BULLION FURNACE, complete, including 10″ Gold Retort, stack and all iron work.
1 NO. 5 STYLE B GATES FINE CRUSHER.
1 LOT REPAIR PARTS FOR HUNTINGTON MILLS, including roller shells, ring dies, scraper bars, shoes, screens, clamping plates, all new, never used.
1 LARGE LOT OF PIPE AND FITTINGS.
1 LOT BOLTS, WASHERS, RIVETS AND NUTS.
1 LOT OF MISCELLANEOUS SHAFTING, PULLEYS, PILLOW BLOCKS, HANGERS, ETC.
120′ RUBBER BELTING, 28″, 6-ply.
58′ RUBBER BELTING, 18″, 4-ply.
150′ RUBBER BELTING, 16″, 4-ply.
70′ RUBBER BELTING, 14″, 4-ply.
2 LOCOMOTIVES, 20″ gauge, built by H. K. Porter Co., Pittsburgh, one 6x10 cylinders, the other 8x14 cylinders, both saddle tank.

FOR FULL INFORMATION AND PRICES, APPLY TO : : :

CHAS. E. BILLIN & CO.,
1543 Marquette Building,
All Offers Subject to Previous Sale. CHICAGO, ILL.

"Union" Hoist.



The above illustrates the 25 H. P. double cylinder, single drum "Union" hoist, with all the latest improvements.

THE UNION GAS ENGINE CO.

—BUILD THE—

"Union" Gas Engines,

Which use either MANUFACTURED or NATURAL GAS, ORDINARY STOVE GASOLINE (NAPHTHA or BENZINE), DISTILLATE or KEROSENE.

TATIONARY ENGINES for All Kinds of Work in Sizes from 3 to 300 h. p. in actual use.
"UNION" COMBINED HOISTS in Sizes from 2 to 130 h. p. in actual use.
"UNION" COMBINED COMPRESSORS—20, 30, 40 h. p.
HOISTS and COMPRESSORS Can Be Built in Larger Sizes to Order.
"UNION" MARINE ENGINES, 4 to 200 h. p., of Single, Double and Four-Cylinder Types.
FIFTEEN YEARS' EXPERIENCE Building Gas and Oil Engines.
"UNION" ENGINES Are In Use All Over the United States.
"UNION" ENGINES Are Simple, Durable and Economical.

Office, 248 First Street. Works, Corner First and Clementina Streets. SAN FRANCISCO, CAL.

ERICSSON SWEDISH TELEPHONES

Seem to possess almost human intelligence. They respond to every requirement in a smooth, positive fashion that shows what a perfect telephone can do. Besides this they have unequalled strength and durability. Their reputation as "STANDARD OF THE WORLD" is built on merit. Is the best too good for you?

ERICSSON TELEPHONE CO. 296 BROADWAY NEW YORK.

Electric, Railway and Manufacturers' Supply Co.,

RAILWAY SUPPLIES AND ELECTRICAL SPECIALTIES.

Pacific Coast Agents ERICSSON TELEPHONE COMPANY.

WE CARRY FULL LINE OF ABOVE GOODS.

548 MISSION STREET, SAN FRANCISCO, CAL.

WEST COAST OF MEXICO.

WÖHLER, BARTNING Suc's, Mazatlan (Sinaloa), Mex.

Bankers, Importers, Exporters and Commission Merchants.

Representatives and Agents of the principal Mining Companies in the State of Sinaloa and the dependencies of the Pacific coast in the States of Durango, Chihuahua, Sonora, Lower California and Jalisco.

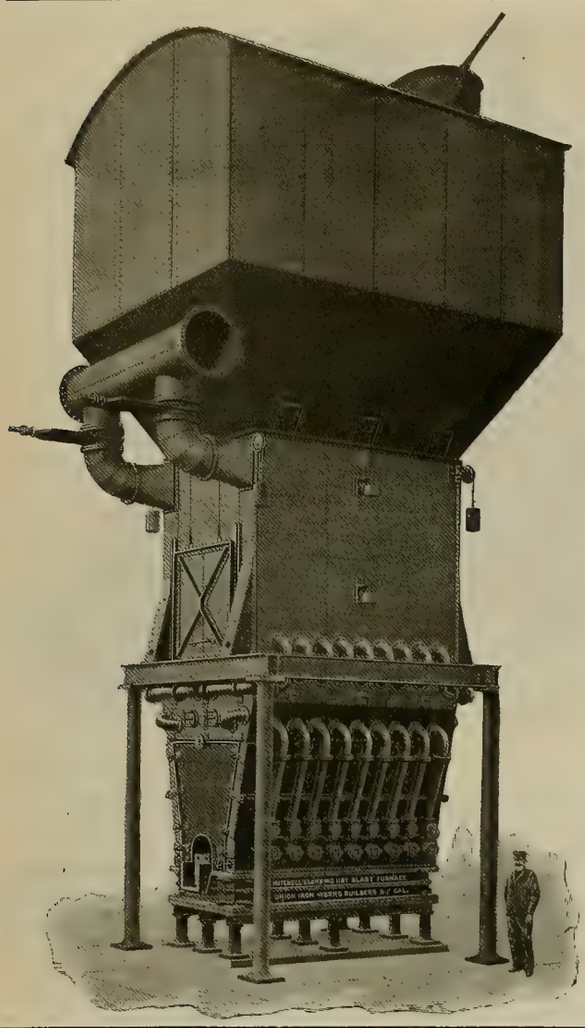
ORE BUYERS AND EXPORTERS. - MINING SUPPLIES.

RIVETED SHEET STEEL WATER PIPE

For Placers, Water Powers, Irrigation, Etc.

THE WEIGELE PIPE WORKS

2949-51 Larimer St. DENVER, COLORADO



UNION IRON WORKS,

222 MARKET ST., SAN FRANCISCO, CAL.

Hot Blast Water Jacket Furnace.

The picture shows the latest type of Economic Hot Blast Water Jacket Mitchell Furnace, built for the Copper Queen Consolidated Mining Company of Arizona. This furnace is adapted to reduce at one operation raw copper sulphide ores to a matte suitable for bessemerizing, without preliminary roasting.

UNION IRON WORKS,
222 MARKET STREET,
SAN FRANCISCO, CAL.

AMERICAN STEEL & WIRE CO.,

WIRE ROPE

For Mining and Logging Use,
Hoisting and Haulage Transmission.

COPPER AND STEEL WIRES AND BARS,
ALL SHAPES AND SIZES.

GEO. H. ISMON, Pacific Coast Sales Agent, 8-10 Pine St., San Francisco, Cal.

SELBY SMELTING AND LEAD CO.,

REFINERS OF GOLD AND SILVER BARS, GOLD DUST, ETC.

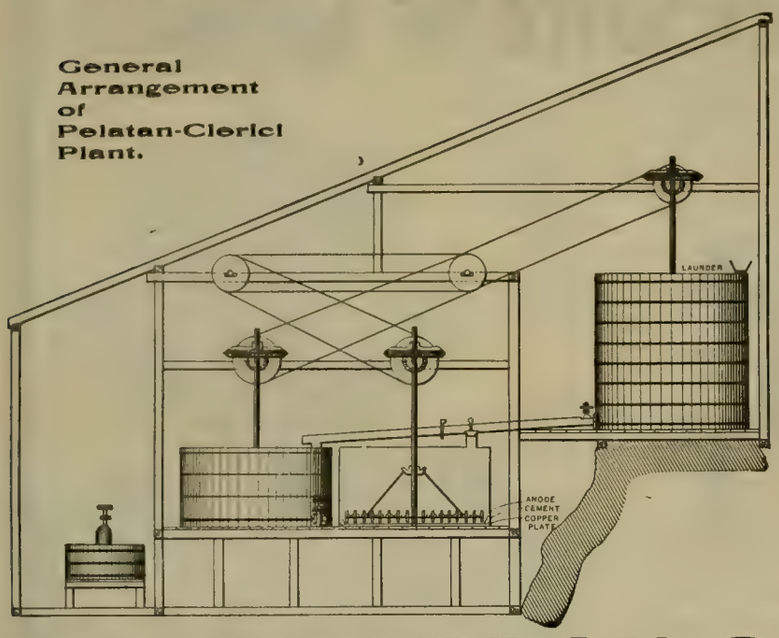
Buyers of Gold, Silver, Lead and Copper Ores, Gold Concentrates, Lead Bullion, Cyanide Product, Etc.

ORE AND BULLION ASSAYERS.

Works at VALLEJO JUNCTION, CAL. Office, 416 MONTGOMERY ST., SAN FRANCISCO, CAL.

THE "PELATAN-CLERICI" PROCESS

OF TREATING REFRACTORY ORES



Saves the precious metals by the simplest, most economical and most efficient process known. No roasting or previous treatment, except ordinary crushing. Extraction complete in from 6 to 12 hours. Extracts equally well both fine refractory gold and coarse gold in the form of amalgam. Makes a greater saving of gold than any other process from raw material at less cost. The electric current and dissolving agent promptly dissolve the precious metals, both gold and silver. Samples of ore tested free of charge. Several mills saving over 90 per cent of values by bullion returns. Simplicity. Economy. Efficiency.

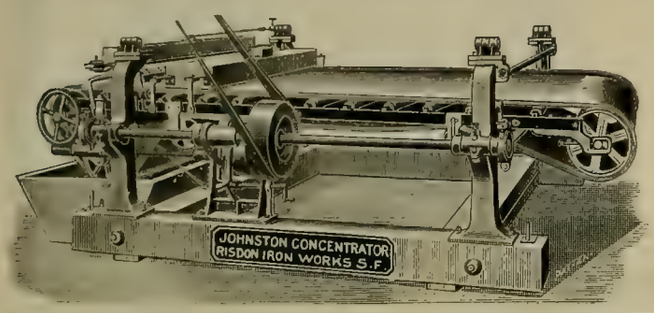
FOR PARTICULARS, WRITE TO

THE RISDON IRON WORKS,

SAN FRANCISCO, CAL.

AGENTS.

The JOHNSTON CONCENTRATOR.



DURABILITY, CAPACITY AND SIMPLICITY : : ARE ITS ESSENTIAL POINTS. : :

SAVES MORE VERY FINE SULPHURETS THAN ANY OTHER CONCENTRATOR MADE.

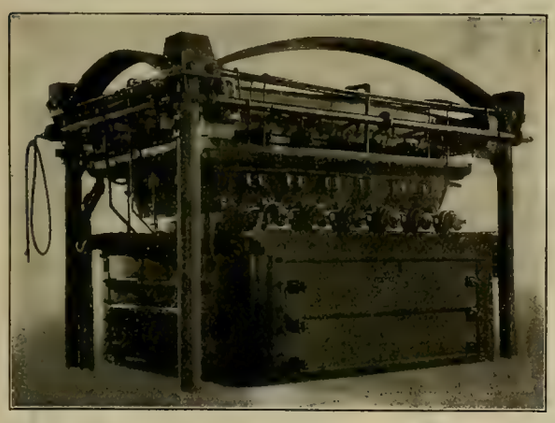
The Johnston Concentrator is slung with arms from above on an angle, giving it the oscillating motion that makes it a perfect machine. This undulating motion immediately settles the sulphurets, retaining all amalgam, leaving sulphurets very clean, one 6-ft. Johnston doing the work of two 4-ft. belt machines.

Send for Catalog No. 14.

Risdon Iron Works,

HOWARD AND BEALE STS., SAN FRANCISCO, CAL., U. S. A.

THE COLORADO IRON WORKS COMPANY,



ENGINEERS AND MANUFACTURERS OF

Smelting Furnaces and Equipments.

The illustration in this advertisement shows one form of our COPPER MATTING FURNACE, employing hot blast; the air being first treated in proper appliance, is conducted through the cast iron bustle pipes placed along the inside of the caisson plates, through the cast iron adjustable tuyeres. This furnace can also be used for silver as well as copper smelting, by changing lining in crucibles. We build them in any size required.

Cold blast may be used if preferred.

The furnace is equipped with our special cast iron jackets, and our patented system of water-jacketed mantles.

Send for our catalogue, showing many different styles of smelters for the treatment of

GOLD, SILVER, LEAD, COPPER AND NICKEL ORES,

also the latest and best method for the economical use of jacket water (a saving of 80% to 90% guaranteed) by our patented

WATER VAPORIZING ATTACHMENT.

We design, manufacture and erect Mills for Concentration and Amalgamation, Milling, Chlorination and Cyanide Processes. In writing for information, give us the analysis or character of the ore to be treated, to enable us to intelligently arrive at the proper method.

Our very complete catalogue of CRUSHING MACHINERY will be sent on application.

THE COLORADO IRON WORKS COMPANY,

ESTABLISHED 1860. DENVER, COLORADO, U. S. A.

CHAS. C. MOORE & CO.,

ENGINEERS,

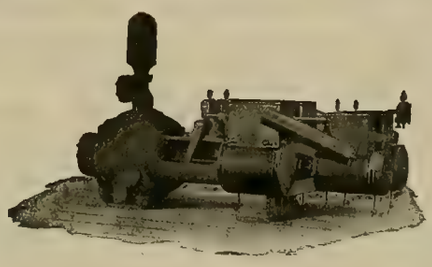
AND DEALERS IN : : : :

High Grade Machinery.

COMPLETE PLANTS INSTALLED.

32 First Street,

Branches—Los Angeles, Seattle. San Francisco, Cal.



Pacific Coast Office

The Babcock & Wilcox Company,

PATENT WATER TUBE

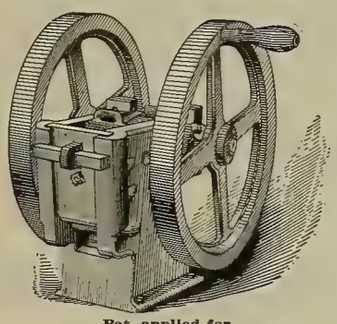
STATIONARY BOILERS MARINE

CHAS. C. MOORE,

MANAGER,

32 FIRST STREET, SAN FRANCISCO, CAL.

Time, Labor and Money Saved for Assayers.

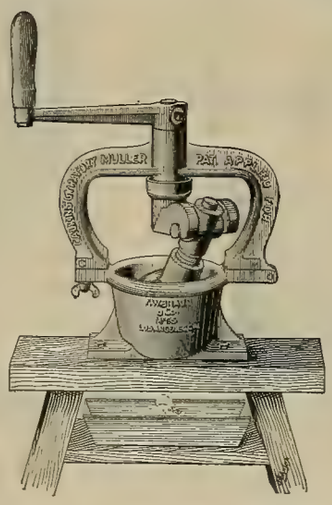


Pat. applied for.

THE SIMPLEX ORE CRUSHER.

For crushing and pulverizing small quantities of ore by either hand or power. It is more easily operated than any other machine of its capacity on the market.

Its features are ease of opening for cleaning and simplicity of adjustment.



CALKINS' GYRATORY MULLER.

A recent invention for reducing crushed ore samples to a pulp. Will quickly pulverize to 100 mesh or finer.

Supersedes the slow and laborious Bucking Plate.

CALKINS' RADIAL BUCKING PLATE.

Designed to replace the old method of pulverizing crushed ore samples to a pulp of any desired fineness with but a fraction of the energy required to operate the old style Bucking Board and Muller.

WRITE FOR OUR NEW DESCRIPTIVE PAMPHLET IN WHICH : ALL OUR NEW SPECIALTIES ARE FULLY DESCRIBED. :

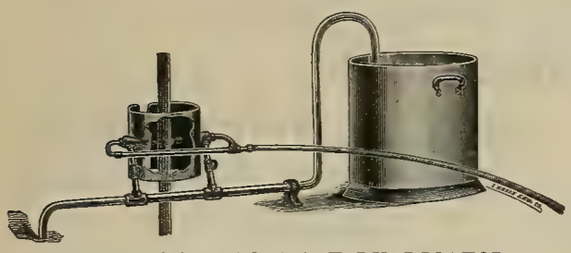
F. W. BRAUN & CO.,

Manufacturers of Modern Appliances for Assayers,

LOS ANGELES, CAL.

Double the Life of Flat Hoisting Ropes by Using

JOHNSON'S WIRE ROPE LUBRICATOR.



JOHNSON'S WIRE ROPE LUBRICATOR.
Patent Applied for.

Lubricating compound forced into the rope by compressed air under high pressure.

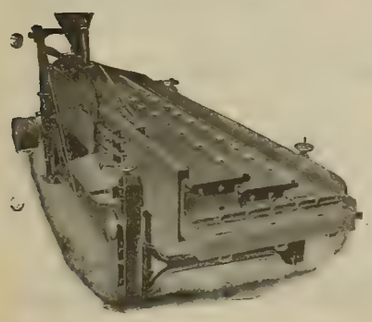
One hundred feet of rope thoroughly saturated to the very center in one minute.

NO USER OF FLAT ROPE CAN AFFORD TO BE WITHOUT THIS MOST VALUABLE DEVICE.

The Hendrie & Bolthoff M'f'g & Supply Co.

DENVER, - - - - - - - COLORADO.

THE IMPROVED BARTLETT CONCENTRATING TABLE.



The only table made that will take the place of jigs and do away with costly and complicated machinery.

Especially designed for separating zinc from lead.

Solid Iron Tops, planed to a true surface.

All parts are interchangeable.

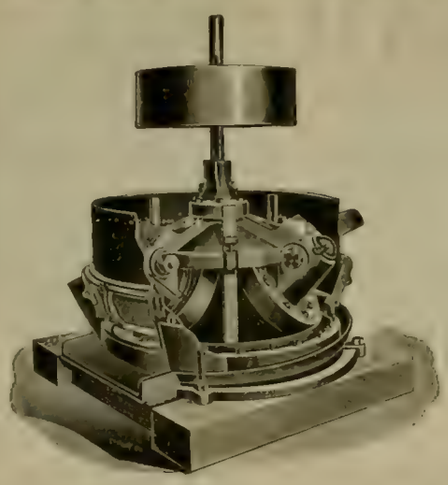
Wearing parts reduced to a minimum.

Capacity from 15 to 45 tons in 24 hours, according to class of ore.

Our illustrated catalogue contains all the latest information on the concentration of ores. Mailed on application.

THE COLORADO IRON WORKS CO.,

Established 1860. DENVER, COLO., U. S. A.

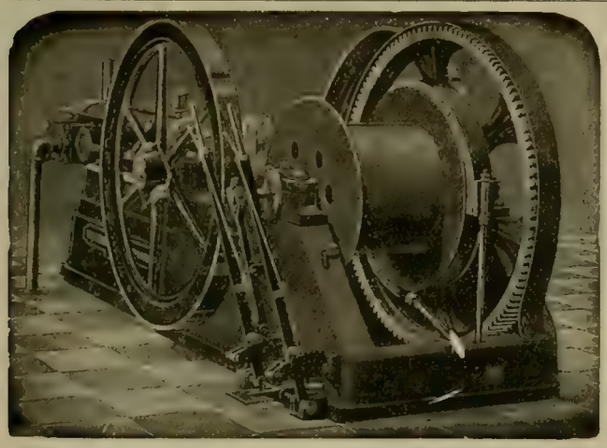


THE GRIFFIN
THREE ROLLER
ORE MILL.

The Griffin Three Roller Ore Mill is a simply constructed Mill, suitable for working all kinds of ores that require uniformly fine crushing by the wet process. This Mill is a modification of the well-known Chilian Mill, but the rollers run upon a crushing ring or die, which is inclined inwardly at an angle of about 30 degrees, the rollers themselves also being inclined to the central shaft of the Mill, thus utilizing the centrifugal force, as well as the weight of the rollers themselves as a crushing agent. The Griffin Three Roller Ore Mill is therefore a Mill of great strength, and has few wearing parts. We construct these Mills with extreme care, using only the best of raw materials, which are most carefully worked by men who are specialists as mill builders. We sell the Griffin Ore Mill on its determined merits, and will gladly supply full information regarding it to any one.

SEND FOR FREE ILLUSTRATED AND DESCRIPTIVE CATALOGUE TO

Bradley Pulverizer Co., Boston, Mass.



FAIRBANKS-MORSE GASOLINE-DISTILLATE GEARED HOISTER.

An efficient and reliable combination of a Fairbanks-Morse Gasoline-Distillate Engine on the same base with a Friction Hoist. Modern and up to date. We publish a special catalogue describing our Hoister which we gladly mail prospective purchasers.

FAIRBANKS-MORSE GASOLINE-DISTILLATE ENGINES.

ALL SIZES UP TO AND INCLUDING 54 HORSE POWER.
For Pumping, Milling, Lighting, Air Compressors, Etc.

FOR CATALOGUES AND FULL INFORMATION, ADDRESS

FAIRBANKS, MORSE & CO.,

310 MARKET ST., SAN FRANCISCO, CAL.
201 N. LOS ANGELES ST., LOS ANGELES, CAL.
FIRST AND STARK STS. PORTLAND, OGN.
1600 SEVENTEENTH ST., DENVER, COL.
FRANKLIN AND MONROE STS., CHICAGO, ILL.

Leschen Co.'s {Patent Aerial} {WIRE ROPE} TRAMWAY

FOR TRANSPORTATION OF ORE, COAL, DIRT, TIMBER, ETC.

Perfect Grip Clip,
Absolutely Safe,
Loads Automatically,
Unloads Automatically,
Operated by One Man,
Cost of Maintenance Low,
Capacity Largest Obtainable.

ALSO SOLE MANUFACTURERS
PATENT FLATTENED STRAND

[TRADE MARK REGISTERED.]
—AND—

Wire Rope
OF EVERY DESCRIPTION.

MANILLA, SISAL, BLOCKS, ETC.

A. LESCHEN & SONS ROPE CO.,

Home Office: 920-922 North Main St., ST. LOUIS, MO. Branch Offices: 92 CENTER ST. (Cor Leonard St.). NEW YORK. 47-49 SOUTH CANAL ST., CHICAGO, ILLS.

THE FULTON Variable Motion Continuous Flow PUMPS

are made in four sizes with capacities up to 30,000 gallons per hour. THE FULTON DOUBLE PLUNGER CYLINDERS to work in connection with them, in 20 different sizes and lengths.

THE FULTON SINGLE ACTING PUMPS are made in 25 different sizes and lengths. The Valves and working parts of both Single and Double Acting Fulton Pumps can be removed, repaired and replaced without disturbing either the Column Pipe or Cylinder.

Manufactured by A. T. AMES, Galt, Cal.

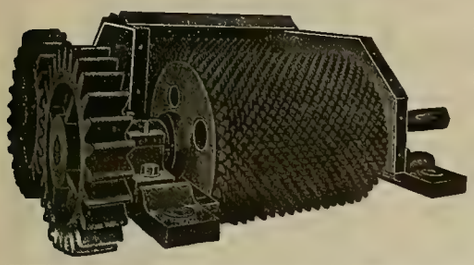
THE IDEAL CONVEYOR BELT

Is the one that will carry stone, ore, coal, wet or dry material, holding buckets firmly and securely; will stand all kinds of exposure, and resist the heaviest strains during a long period of service. This is what the **LEVIATHAN BELT** has done, and we quote the following from a letter from the New York Steam Co.:

"We have used Leviathan Belting for four years, up to 24-inch by 8-ply, elevating and conveying coal. Some of the Belting is outside, exposed to freezing weather; some in a steam bath. In both conditions the results have been very gratifying, over 500 tons having been handled in ten hours time."

MAIN BELTING COMPANY,
1225-41 Carpenter Street, Philadelphia.
55-57 Market St., Chicago. 120 Pearl St., Boston.
SEND FOR PRICE LISTS AND SAMPLE.

LINK-BELT ELEVATORS —AND— CONVEYORS.



BREAKER ROLLS, PICKING TABLES,
MALLEABLE IRON BUCKETS, SHAFTING, PULLEYS, GEARING, CLUTCHES, Etc.
Catalogue Upon Application.

LINK-BELT MACHINERY CO.,
Engineers, Founders, Machinists,
CHICAGO, U. S. A.
DENVER, 1328 17th St.,
A. E. LINDROOTH, Manager.

ROBINS BELT CONVEYORS

HANDLE
ORE, GRAVEL, TAILINGS, DREDGINGS.

Cut shows belt conveyor carrying 1200 tons per hour of rock and gravel from dredger on Danube river.

ROBINS CONVEYING BELT CO.,
Park Row Building, NEW YORK.

TELL US WHERE YOU'RE AT.

4 Cents Per Ton Per Mile

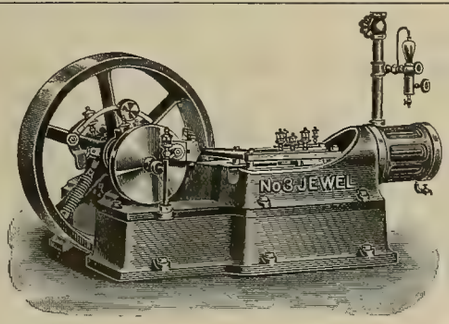
Is what it costs to transport Ore with our systems of Aerial Wire Rope Tramways.

We'd like to send you our book telling you all about it, but we can't do it unless you write us

WHERE YOU'RE AT.

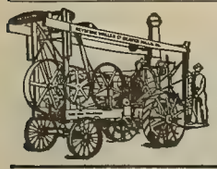
THE J. H. MONTGOMERY MACHINERY CO.,
DENVER, COLO., U. S. A.

JEWEL ENGINES



A THOROUGHLY RELIABLE, SIMPLE, HIGH CLASS, PERFECTLY GOVERNED AUTOMATIC ENGINE AT A REASONABLE PRICE.

BAKER & HAMILTON,
SAN FRANCISCO, SACRAMENTO, LOS ANGELES.



Prospecting Machinery.

Multitudes in use for testing for minerals. Sizes and equipments to suit any and all conditions. Unexcelled for Placer Testing, Oil Wells, Water Wells, testing for Lead and Zinc, Iron and Coal; goes through anything; brings up everything. Large sizes drill as much as 1500 feet. In use all over the world. Every purchaser pleased. Used on boats for testing river and lake beds. Water no hindrance. No skilled labor required.

KEYSTONE DRILLER CO., Beaver Falls, Pa., U. S. A.

FOWLER'S AIR SPACE and Asbestos Sectional Covering.
As a Non-Conductor, Unequaled.
Special Rates for Steam Boilers and Drums.
G. C. Fowler, 656-58 Howard St., S. F.

The Only GRAND PRIX (Highest Award)

Given at the PARIS EXPOSITION, 1900, to Builders of

Mining Machinery and Air Compressors

Was Awarded to this Company. In Addition to the GRAND PRIX,

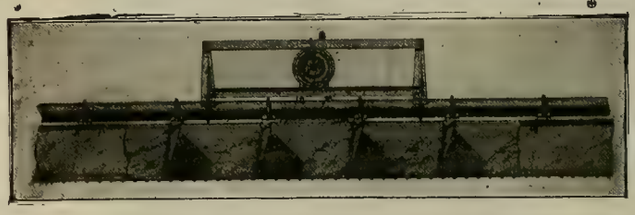
The **GOLD MEDAL** was also Awarded.

The INGERSOLL-SERGEANT Drill Company.

26 Cortlandt Street, New York.

RECIPROCATING CONVEYORS

FOR TRANSPORTING QUARTZ, TAILINGS, SAND, ETC.



FEEDING AND MEASURING DEVICES.
PERFECT DISCHARGE ELEVATORS.
COMPLETE INSTALLATIONS.

HEYL & PATTERSON, Pittsburg.

IMPROVED GOLD DREDGES.

BUCYRUS COMPANY.

SINGLE LIFT, CONTINUOUS BUCKET TYPE WITH

Working Capacity from 1500 to 5000 cubic yards per day.

IMPROVED GOLD SAVING DEVICE
of highest efficiency.

DREDGES CONSTRUCTED COMPLETE UNDER GUARANTEE OF TRIAL RUN.

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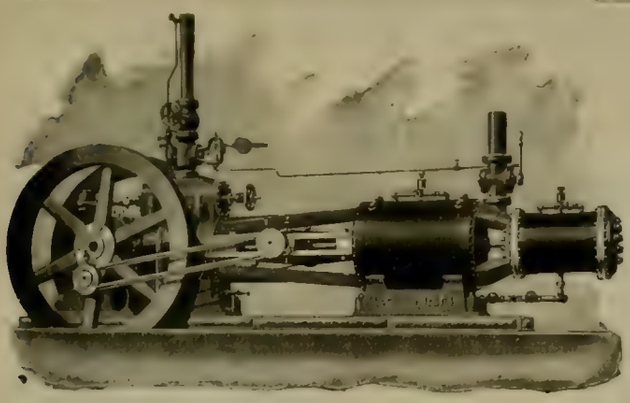

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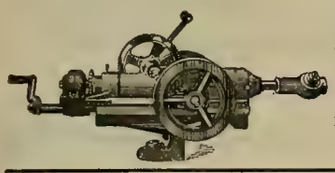

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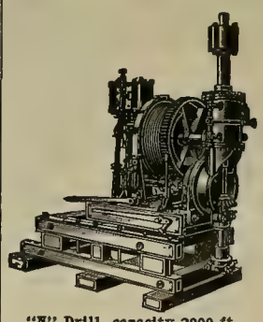

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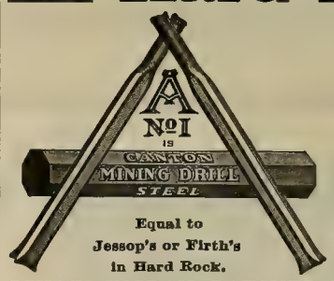

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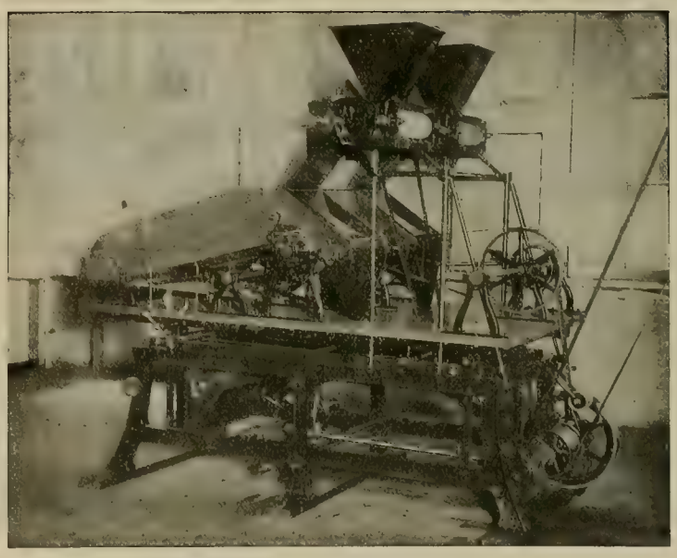

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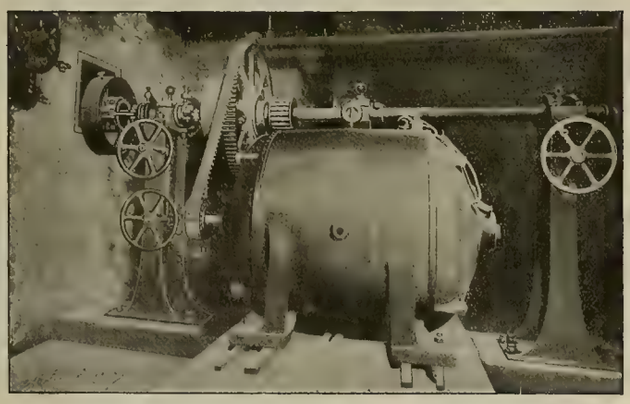

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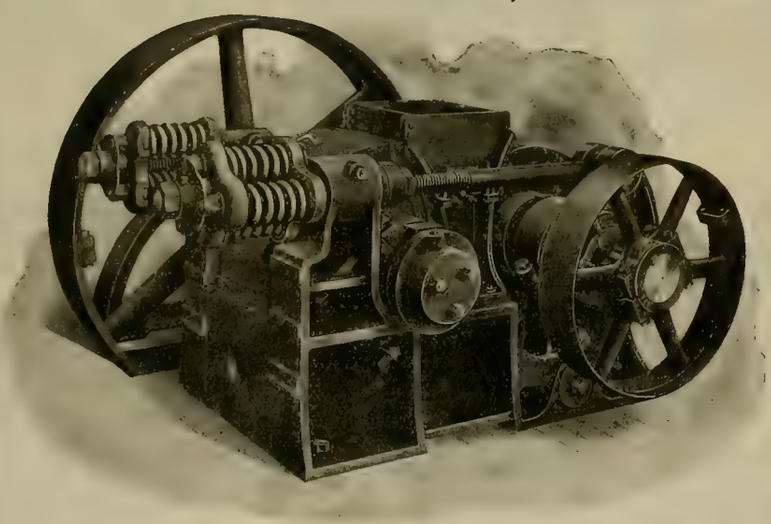

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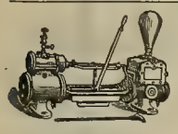

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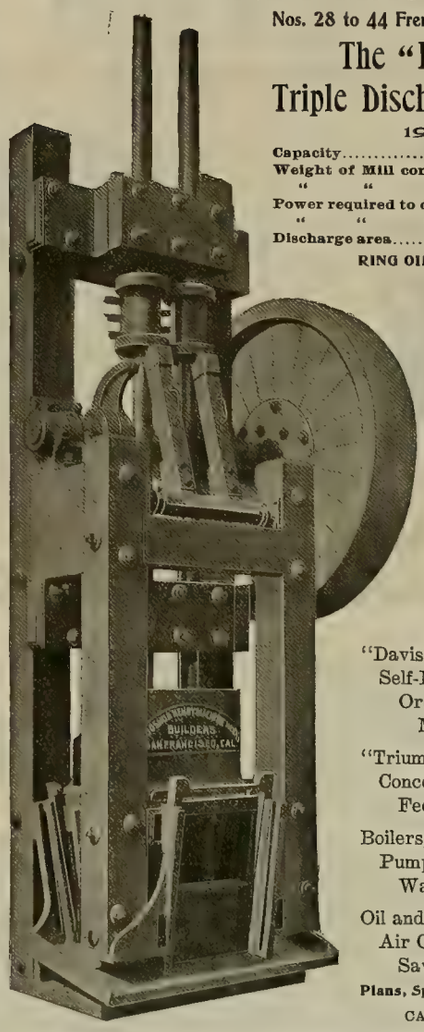

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1900 MODEL.

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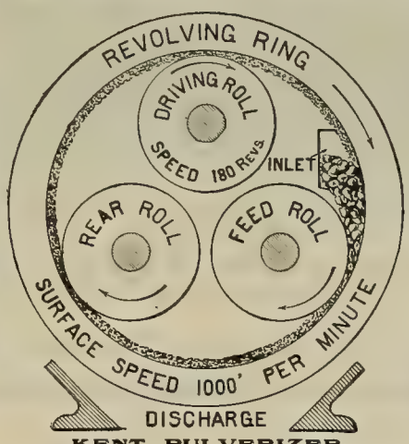

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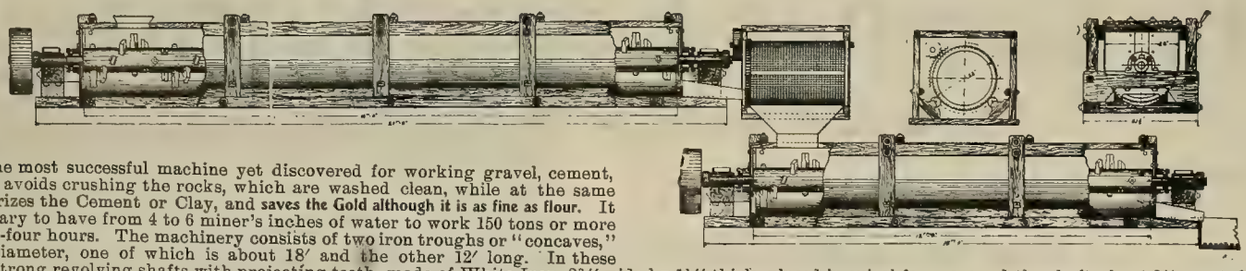

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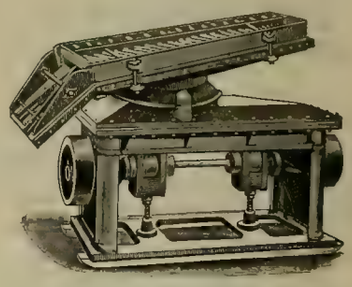

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Capacity, 10 to 50 Tons Daily.

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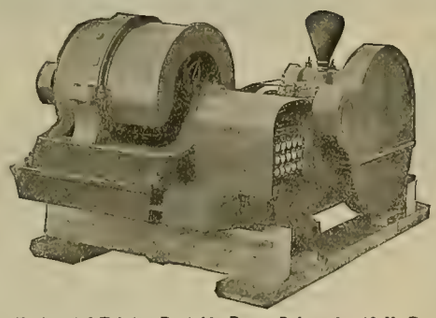

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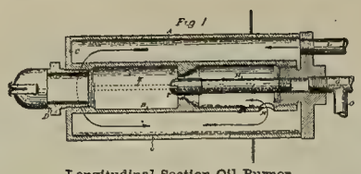

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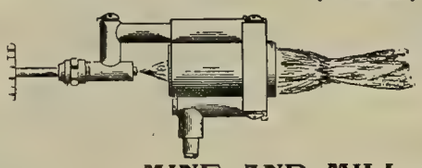

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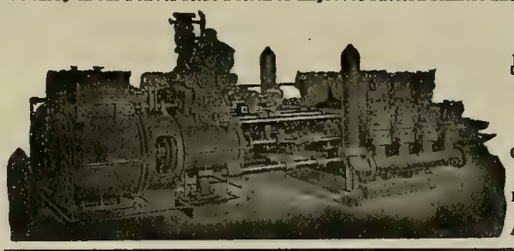

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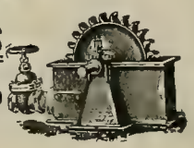

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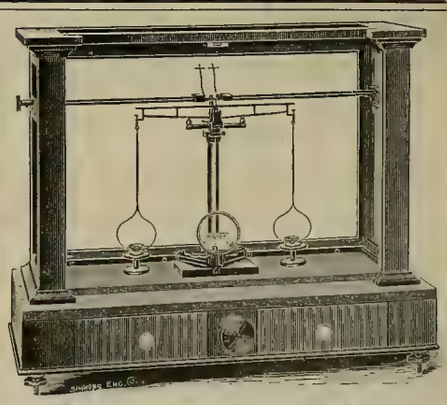

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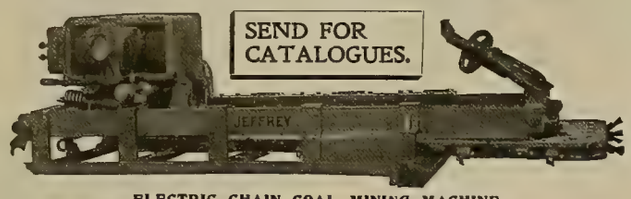

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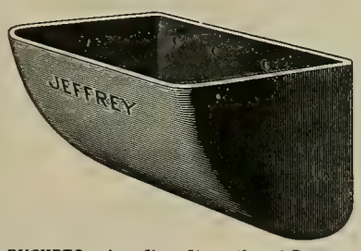

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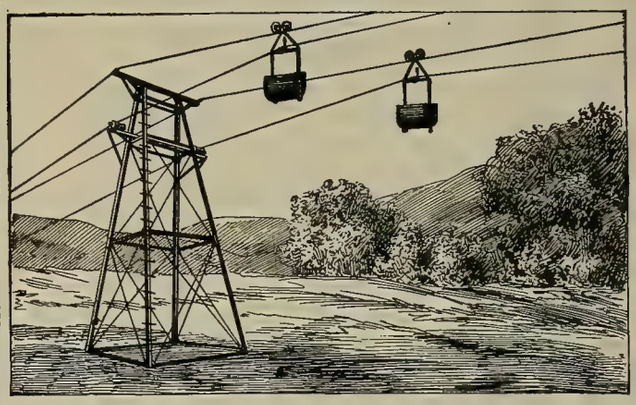

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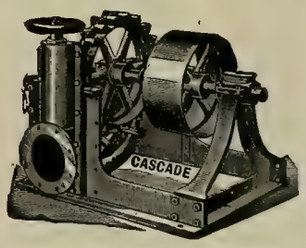

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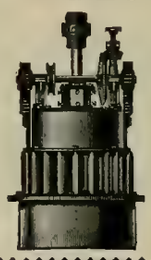

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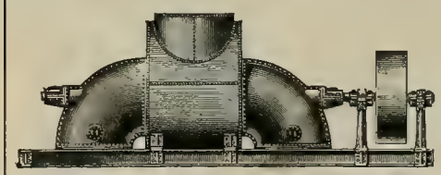

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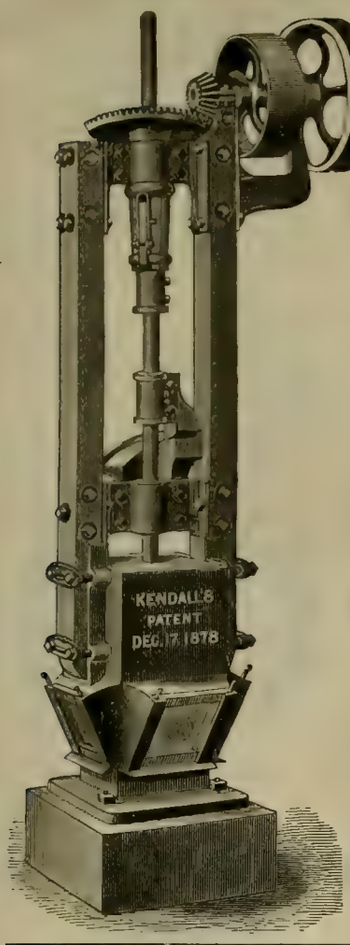

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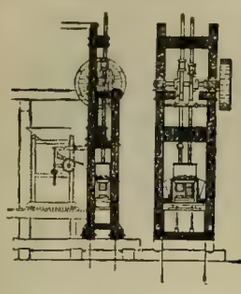

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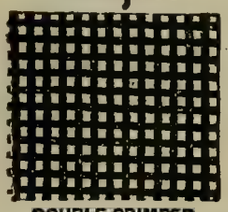

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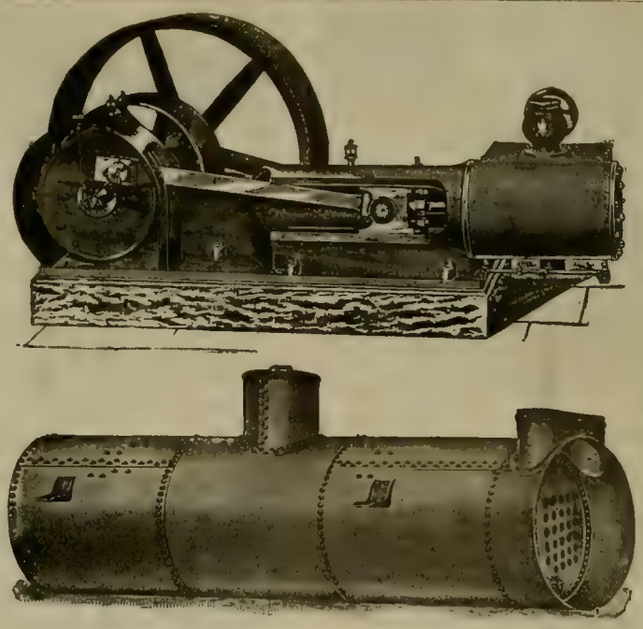

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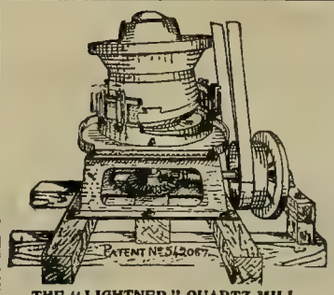

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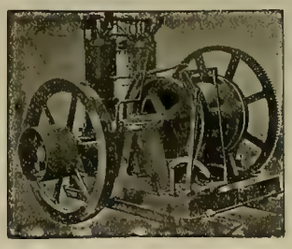

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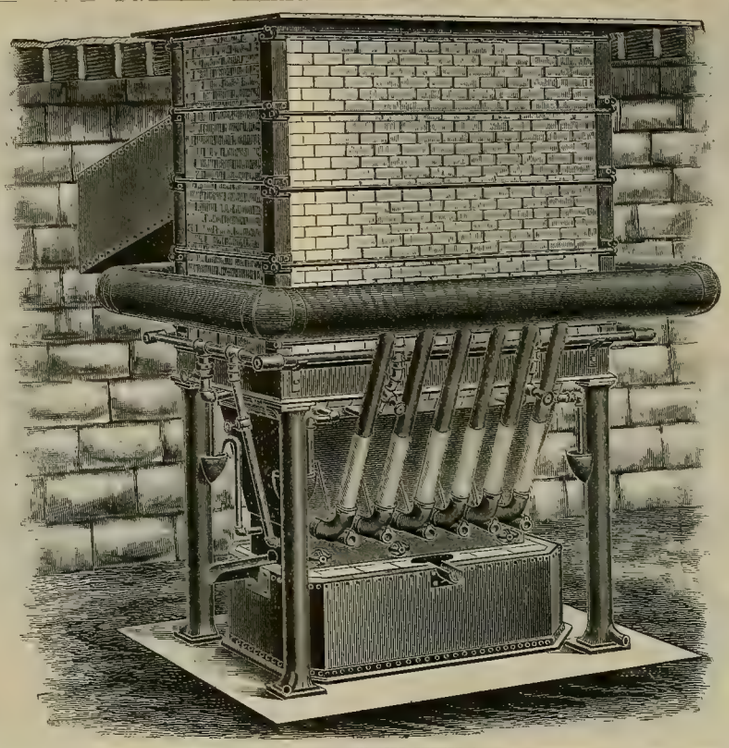

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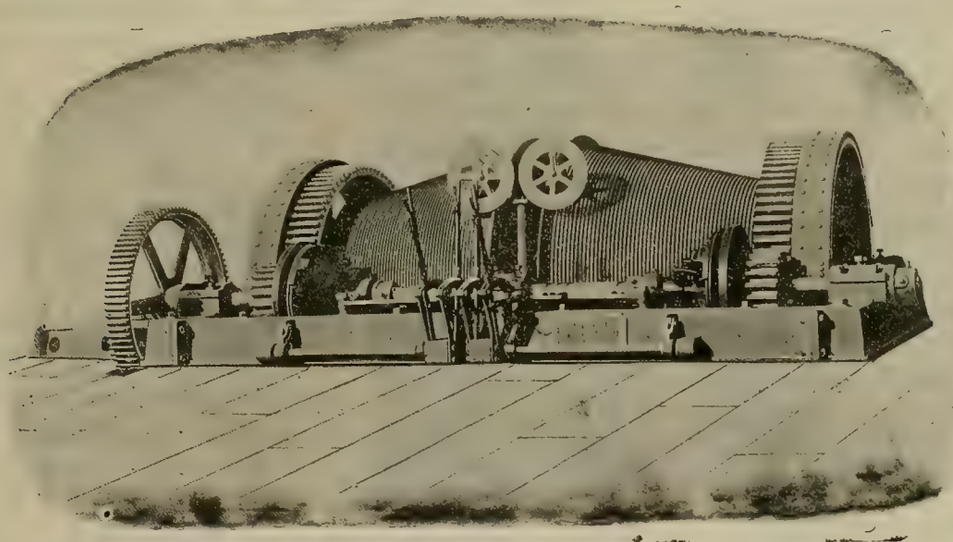

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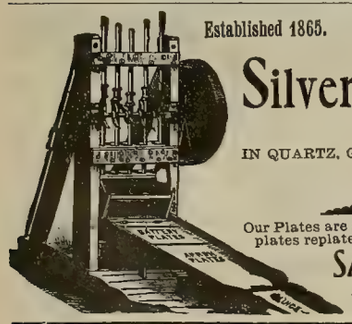

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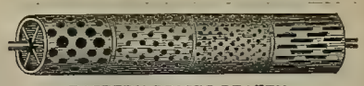

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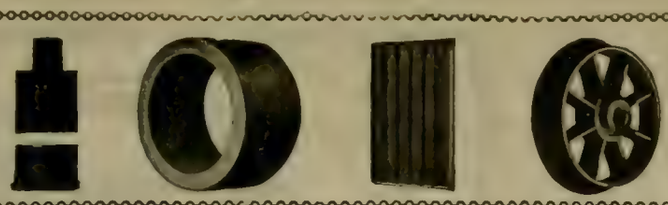
HARD  TOUGH

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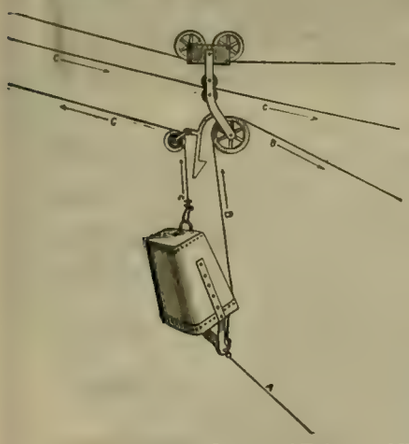

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ASSESSMENT NOTICES.

MARIPOSA COMMERCIAL AND MINING COMPANY.—Location of principal place of business, San Francisco, California; location of works, Mariposa County, California.

Notice is hereby given, that at a meeting of the Board of Directors, held on the 24th day of December, 1900, an assessment (No. 20) of Ten ($10) Dollars per share was levied upon the capital stock of the corporation, payable immediately in United States gold coin, to the secretary, at the office of the company, 320 Sansome street, room 24, San Francisco, California.

Any stock upon which this assessment shall remain unpaid on the 11th day of February, 1901, will be delinquent, and advertised for sale at public auction; and unless payment is made before, will be sold on SATURDAY, the 2nd day of March, 1901, to pay the delinquent assessment, together with the costs of advertising and expenses of sale.

By order of the Board of Directors.

JOSEPH H. MOOSER, Secretary.

Office—320 Sansome street, room 24, San Francisco, California.

EUREKA CONSOLIDATED DRIFT MINING COMPANY.—Location of principal place of business, San Francisco, California; location of works, Placer County, California.

Notice is hereby given, that at a meeting of the Board of Directors, held on the 11th day of December, 1900, an assessment (No. 28) of one-half cent per share was levied upon the capital stock of the corporation, payable immediately in United States gold coin, to the secretary, at the office of the company, Room 31, 214 Pine street, San Francisco, California.

Any stock upon which this assessment shall remain unpaid on the 15th day of January, 1901, will be delinquent, and advertised for sale at public auction; and unless payment is made before, will be sold on TUESDAY, the 5th day of February, 1901, to pay the delinquent assessment, together with the costs of advertising and expenses of sale.

By order of the Board of Directors.

GEO. W. DIXON, Secretary.

Office—Room 31, 214 Pine street, San Francisco, California.

POSTPONEMENT.

The date of the delinquency of the foregoing assessment (No. 28) has been postponed to TUESDAY, the 29th day of January, 1901, and the day of sale from the 5th day of February, 1901, to TUESDAY, the 12th day of February, 1901.

By order of the Board of Directors.

GEO. W. DIXON, Secretary.

Office—Room 31, No. 214 Pine street, San Francisco, California.

TANANA MINING COMPANY.—Location of principal place of business, San Francisco, California.

Notice is hereby given, that at a meeting of the Board of Directors, held on the 20th day of December, A. D. 1900, an assessment (No. 2) of ten cents per share was levied upon the capital stock of the corporation, payable immediately in United States gold coin to the secretary, Edward H. Stearns, at his office, Room 801 Claus Spreckels Building, Cor. Third and Market Sts., San Francisco, California.

Any stock upon which this assessment shall remain unpaid on the 13th day of February, 1901, will be delinquent and advertised for sale at public auction; and unless payment is made before, will be sold on WEDNESDAY, the 6th day of March, 1901, to pay the delinquent assessment, together with the costs of advertising and expenses of sale.

By order of the Board of Directors.

EDWARD H. STEARNS, Secretary.

Office—Room 801 Claus Spreckels Building, Cor. Third and Market Sts., San Francisco, California.

YUBA RIVER GOLD DREDGING COMPANY.—Location of principal place of business, San Francisco, California; location of works, Smartsville, Yuba County, California.

Notice is hereby given, that at a meeting of the Board of Directors, held on the 4th day of January, 1901, an assessment (No. 2) of three cents (3 cents) per share was levied upon the capital stock of the corporation, payable immediately in United States gold coin, to the secretary, at the office of the company, No. 214 Pine street, Room 29, San Francisco, California.

Any stock upon which this assessment shall remain unpaid on the 9th day of February, 1901, will be delinquent, and advertised for sale at public auction; and unless payment is made before, will be sold on TUESDAY, the 5th day of March, 1901, to pay the delinquent assessment, together with the costs of advertising and expenses of sale.

By order of the Board of Directors.

ALBERT CERF, Secretary.

Office—No. 214 Pine street, Room 29, San Francisco, California.

LARKIN MINING COMPANY.—Location of principal place of business, San Francisco, California; location of works, El Dorado County, California.

Notice is hereby given, that at a meeting of the Board of Directors, held on the 18th day of January, 1901, an assessment (No. 9) of two (2) cents per share was levied upon the capital stock of the corporation, payable immediately in United States gold coin, to the secretary, at the office of the company, 112 Main street, San Francisco, California.

Any stock upon which this assessment shall remain unpaid on the 25th day of February, 1901, will be delinquent and advertised for sale at public auction; and unless payment is made before, will be sold on MONDAY, the 18th day of March, 1901, to pay the delinquent assessment, together with the costs of advertising and expenses of sale.

By order of the Board of Directors.

N. F. REMINGTON, Secretary.

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AMERICAN OIL AND REFINERY COMPANY.—Location of principal place of business, San Francisco, California. Location of works, Contra Costa County, California.

NOTICE.—There are delinquent upon the following described stock, on account of assessment (No. 2) levied on the 26th day of November, 1900 the several amounts set opposite the names of the respective shareholders, as follows:

Names.	No. Cert.	No. Shares.	Amt.
Abbott, William	720	50	2 50
Abbott, William	721	50	2 50
Abbott, William	722	50	2 50
Abbott, William	723	25	1 25
Abbott, William	734	25	1 25
Anthony, J. C., Trustee	797	1,000	50 00
Anthony, J. C., Trustee	798	1,000	50 00
Anthony, J. C., Trustee	799	1,000	50 00
Anthony, J. C., Trustee	973	1,000	50 00
Anthony, J. C., Trustee	1021	4 300	215 00
Dignan, J. P.	1039	1,000	50 00
French, Mrs. Mary L.	385	2	10
Goodenough, S.	1046	380	19 00
Holbrook, W. E., Trustee	897	10 000	500 00
Holbrook, W. E., Trustee	898	11,000	550 00
Holbrook, W. E., Trustee	899	4 500	225 00
Holbrook, W. E., Trustee	909	4,500	225 00
Kielhofer, Mrs. Louis	298	2	10
Kraehner, Louis L.	471	3	15
Laird, Mrs. L. N.	230	5	25
Lord, Mrs. Leona E.	327	2,000	100 00
Lucas, Mrs. T. R.	848	10	50
Mayer, Mrs. L.	406	800	40 00
Massey, James B.	914	1	05
McKelvey, Mrs Angel'na	71	12	60
McAllister, H. L.	1071	100	5 00
Pope, Wm.	656	50	2 50
Pope, Wm.	695	20	1 00
Pope, Wm.	764	30	1 50
Pope, Wm.	908	20	1 00
Raht, Julia F.	321	25	1 25
Raht, Julia F.	453	40	2 00
Rachel, Mrs. Eliza	856	400	20 00
Royce, Lizzie A.	441	5	25
Russell, G. E.	125	3	15
Stover, W. M.	1047	480	24 00
Truitt, J. J.	399	5	25
Walser, Mark	858	1,000	50 00
Walser, Mark	859	1,000	50 00
Walser, Mark	860	1,000	50 00
Walser, Mark	861	1,000	50 00
Walser, Mark	863	500	25 00
Walser, Mark	867	500	25 00
Walser, Mark	868	500	25 00
Walser, Mark	869	500	25 00
Walser, Mark	870	500	25 00
Walser, Mark	871	500	25 00
Walser, Mark	872	500	25 00
Walser, Mark	921	50	2 50
Walser, Mark	926	5,000	250 00
Walser, Mark	927	5,000	250 00
Walser, Mark, Trustee	596	500	25 00
Walker, Mrs. S. E. D. E.	375	120	6 00
Young, R.	761	328	16 40

And in accordance with law, and an order from the Board of Directors, made on the 26th day of November, 1900, so many shares of each parcel of such stock as may be necessary, will be sold at public auction at the office of said corporation, in Rooms 322-323 Parrott building, San Francisco, California, on MONDAY, the 28th day of January, 1901, at the hour of 1 o'clock P. M. of said day, to pay said delinquent assessment thereon, together with costs of advertising and expenses of sale.

J. C. ANTHONY, Secretary.

Office—Rooms 322-323, Parrott building, San Francisco, California.

POSTPONEMENT.

By order of the Board of Directors the day of sale of the above delinquent stock has been postponed to MONDAY, the 11th day of February, 1901, at the hour of 1 o'clock P. M., at the office of said corporation in Rooms 322-323 Parrott building, San Francisco, California. J. C. ANTHONY, Secretary.

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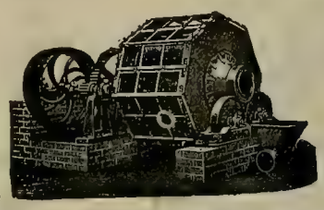

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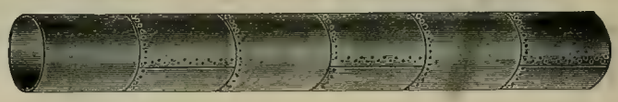

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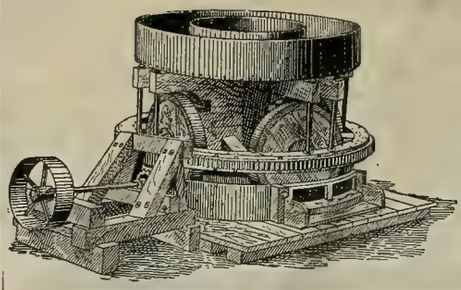

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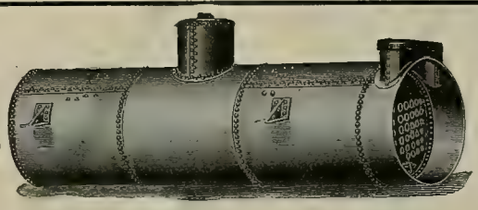

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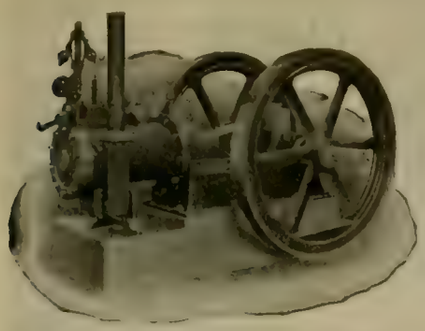

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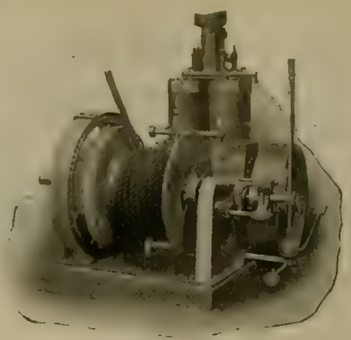

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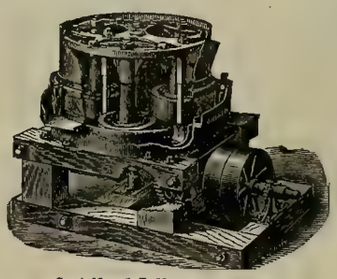

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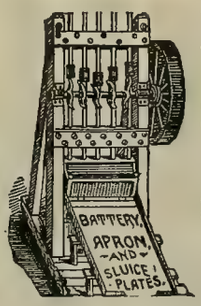

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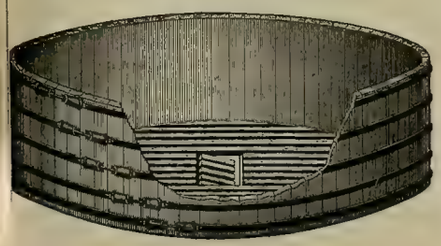

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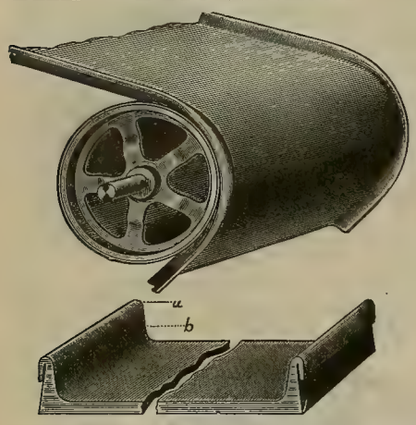

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JAS. S. BROWNELL, ESQ., San Francisco, Cal.—DEAR SIR: The Brownell Patent Lip flange belt for ore concentrators, which I bought of you nearly two years ago, has been in constant use and is in good order and gives us perfect satisfaction. We have several other kinds of belts in the mill, and your belt and flange I consider the best of all. Yours respectfully, ROBT. WALKER, Superintendent.

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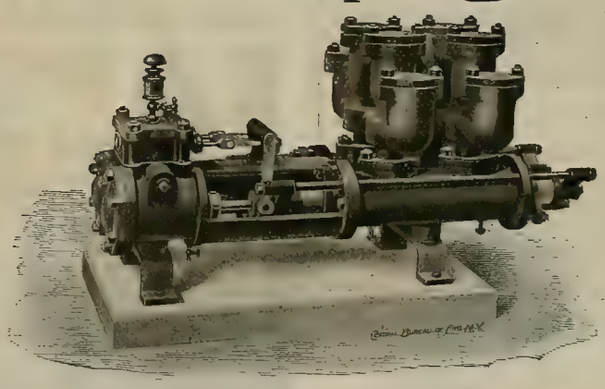

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Whole No. 2115.—VOLUME LXXXII. Number 5. SAN FRANCISCO, SATURDAY, FEBRUARY 2, 1901. THREE DOLLARS PER ANNUM Single Copies, Ten Cents.

A Constant Magnitude.

The problem of time is one which touches all branches of science, and is unsolvable. Time has been regarded as objective; it has been also considered, like space, to be subjective. It is the most general natural law, affecting and affected by all the conditions of human existence. Strictly speaking, there is no such thing as time "past" or "future": there is but one eternal NOW. But as history is fable agreed upon, so for convenience what we call "Time" is arbitrarily divided. Analyzing our conception of time, one finds in it four elements: First, continuity. Time moves on without interruption. During sleep one cannot recognize time, and should be led to conclude that it had been interrupted. But the consideration of the objective world, which has progressed during one's sleep, shows that the discontinuity of time is only apparent, and that it has really progressed without interruption. Secondly, the linear nature of time. Time is a constant magnitude of such a nature that it is possible to pass from one definite value to another, only in one way. This is the same as to designate time as having one dimension. Thirdly, time never returns to a point or value which has once passed, and is thus to be distinguished from a line (with which it has much in common), since a line can be easily so drawn that it will cut itself. Fourthly, time moves on in one definite order. This is absolute, and a given succession in time cannot be reversed.

Fig. 4—Hawthorne and Esmeralda County Views.

Fig. 1—Tonopah, Nevada, Nov. 17, 1900; Butler Buttes to the South.

Fig. 3—Goat Island in Salt Marsh, Silver Peak, Esmeralda Co., Nevada.

Fig. 2—Croppings of the Pacific Copper Mine, Esmeralda Co., Nevada.

Mines of Esmeralda County, Nevada. (See Page 73.)

Canadian Nickel Mining.

Near Sudbury, Ontario, Canada, is a region 70 miles long, 40 miles wide, in which are deposits of nickel ranging from small pockets to hills of ore assaying 3% nickel, 3% copper and about 3% each of iron and sulphur. There are about ten mines producing in the aggregate 700 tons of ore daily, which is reduced to matte in the proportion of 7 to 1, partially burning out the sulphur, reducing that component after about ten weeks' combustion to about 7%. The ore, self-fluxing, is then coarsely crushed and smelted, producing a 40% matte, which is shipped for refining to the Orford Copper Co., N. J. The Canadian Copper Co. of Cleveland, Ohio, and the Mond Nickel Co. of London, two of the largest companies there, are putting in plants designed to produce an 80% matte, to be shipped to their refining plants, the idea being to ultimately separate and utilize all the by-products of the ore.

It is also expected that the sulphur extracted will be utilized in the manufacture of sulphide pulp; that sulphuric acid will be produced in large commercial quantities, and that nickel-steel rails and plate will be produced. Meanwhile the Canadian government proposes an export tax of $7 per ton on nickel ore and a still greater duty on matte, to encourage such "home production."

MINING AND SCIENTIFIC PRESS.

ESTABLISHED 1860.

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W. D. CURTIS.....223 W. Second St., Los Angeles, Cal.

San Francisco, February 2, 1901.

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Barren Zones.

In mining, an ounce of proved fact is worth a ton of unproved theory. There are many theories as yet unproved. There are, too, many substantial facts, generally known now, that were once unproved theories. One of those theories, concerning barren zones, is fast becoming an established fact. It is the old problem in a new phase, "Do mines go down?"

In the majority of cases there comes a time in the development of a mine when zones barren of all ore are encountered. This generally occurs in the case of sulphide ores when what may be styled the permanent water level is reached, and continues through what may similarly be termed the ebb and flow water line.

The theory here comes in that through the seasons this permanent water line rises and recedes, sometimes in Time's countless æons being higher or lower than at others, the ore becoming decomposed and the ores being leached out, new ore bodies meanwhile forming containing no metallic value, occasioning a barren zone. Another theory takes up the dissolving of metals by hot alkaline water, carbonic acid being present, which, meeting with volcanic gases from below, would precipitate metals "along the lines of least resistance," thus again occasioning barren zones, the character of the rock through which the vein in its entirety passed not being throughout its entire extent favorable to the deposition of ore.

The possession of sufficient nerve and money has demonstrated the existence of paying ore bodies below such barren zones. Whatever the cause, the theory that such barren zones actually exist has passed into the stage of accepted fact, it having been found that below such barren zones existed ore of equal value with that above, and that the permanent water line no longer marked the limit of profitable mining. The fact has been demonstrated in deep mining in California, Colorado and Montana, where some of the best paying mines were once abandoned till modern mining methods permitted deeper working. In Amador county, Cal., the Kennedy gold mine, one of the richest in the State, was barren of all pay ore for nearly 200 feet in depth. In Calaveras county the great Gwin mine was once sold for a song because of the occurrence of a barren zone. In Sierra county, Cal., the Sierra Buttes mine was worked to a depth of nearly 3000 feet, when a "barren zone" was encountered, and this property, which once operated ninety-six stamps and has a record of $15,000,000 output, is now abandoned. In Montana the Comet-Rumley mine at Comet, Jefferson county, was a big silver-lead producer, when at a depth of 1500 feet the ore gave out, but upon sinking through a "barren zone" of 60 feet a body of galena 8 feet wide was found, and the mine's output was greater than ever. The same conditions are demonstrable in Cripple Creek and elsewhere in Colorado.

Feeding Water in Stamp Mills.

The editorial in the issue of January 12 on stamp-milling methods has elicited the usual amount of discussion on this subject, which is one of ever-present interest. Among other practical suggestions comes an inquiry as to probable or possible improvement or alteration in the method of feeding water into mortar boxes.

In connection with this detail is brought to mind the criticism some time ago of an eminent Canadian mining engineer, Mr. Bernard Macdonald, manager of the British American Corporation at Rossland, B. C., where, in consideration of possible defects or probable improvement in stamp-milling methods, he advocates a change in one detail, saying:

In considering this question it should be understood that a continuous and uniform stream of water is required in the mortars of the stamp mill to mix with and form a thin pulp of the ore as it becomes pulverized beneath the blows of the falling stamps, and in this condition (thin pulp) to carry it in suspension until discharged through the screen meshes.

It is customary to introduce the water required for this purpose over the top of the mortar in iron pipes or rubber hose. Thus introduced, the water falls about 3 feet before it reaches the top level of the pulp mass in the mortar, where it is still about 7 inches above the crushing surfaces of the shoes and dies. On reaching this position it will be seen that a large portion of it must of necessity be discharged from the mortar before it can be mixed with the ore as it is pulverized. Therefore, such portion fails to effect the purpose for which it was introduced. But perhaps the greatest defect in this system is the fact that the feedwater falling on the pulp mass has a tendency to settle the fine sands and slimes below the discharge level, which not only lessens the discharging capacity of the mortar, but subjects the fine sands to further pulverization after having reached the proper degree of fineness to pass through the screens, thus producing loss by sliming the pulp and unnecessary abrasion of the free gold particles.

The points of superiority claimed for the improved method are that the water, being introduced below or on a level with the crushing surfaces of the shoes and dies under a static head, sweeps off at once from the dies and between them such portion of the ore as has been reduced to a sufficient degree of fineness, and carries it upward into the pulp mass, where it is immediately presented with the most favorable opportunity of being splashed through the battery screens. This removes, to a very considerable degree, the cause of sliming the pulp for which the stamp mill has been noted, and, as will readily be seen, increases the discharging capacity of the mortar and, hence, its crushing capacity. In thus washing away the fine sands and slimes from around the dies, leaving only the coarser particles of ore to occupy these spaces, a favorite receptacle is provided into which the coarse gold may settle and be protected from unnecessary abrasion. Were the water introduced in the customary way, the spaces around the dies would be packed with an impenetrable mass of silt, which would offer no hiding place for the coarse gold, which would be lashed hither and thither through the mortar, losing by abrasion with every contact between the stamps and dies or with the sharp quartz. The points of advantage in this method are: Increase of crushing capacity; decrease of sliming; preparation of the bottom of the mortar to retain and protecting the coarse gold from abrasion.

Where the aim and intent is to make the process one of inside amalgamation—as in Colorado—saving the maximum of gold within the mortar box, the feasibility of Mr. Macdonald's suggestion must remain unsettled in the absence of conclusive experiments, though the matter merits most exhaustive test from an economical standpoint.

Regarding the decrease in sliming which is sought to be attained in some cases, further reference may be made to the European practice of setting the dies in the mortar box in a bed of cement, reaching almost up flush with the surface of the dies. This is claimed by its adherents to occasion an increase in the duty of the stamp by securing easier access to the screen by the crushed ore, and there being no corners to be broken, the wearing away of the dies causing the cement to assume a trough-like shape, thus tending to keep the ore directly under the stamp. This plan would necessitate smashing the cement setting whenever removal of the dies was desired, and while it may be all that is claimed for it, the practice will not be likely to meet with immediate favor.

London Promotion Methods.

Like other long-established conservative systems, the London mine promoter has certain ways of his own, and it is a waste of time on the part of the American mine owner or any one else to attempt change therein. An American mining man in London rightly introduced will be speedily ushered into the right promoting circle, a very limited one. He may take all the time he desires to explain that their methods are wrong and his right; he will be courteously listened to and gravely answered that there is doubtless a good deal in what he is saying, and he is then left to learn by experience that there are no changes. They have the game; they are the dealers, and any one who wants to play must conform to the rules of the game as established by them.

As said, there are a few absolutely reliable promotion houses in London. If one of these slow-going respectable concerns takes up a project it has considerable assurance of attention. The general public, the British capitalist possessed of inclination and ability to invest, relies almost solely on what these promoters say. The investor does not do much inquiring whether the property is in California or Australia or Mexico. He is at times a big investor, but is always a poor hand at investigation. The question with him is who is behind it in London. If the promoter has his confidence he doesn't care whether it is a Milwaukee brewery or a Montana copper mine; a California hydraulic proposition or a Chicago patent medicine plant; it is enough for him to know that So-and-So, doing business at the old stand in London when George III was King, says it is all right. He believes what the promoters tell him. If they advise investment the money is ready. He goes on the assumption that they have done the investigating and know all about it, or they wouldn't advise him to go into it. It is a matter of confidence, of commercial integrity, of financial belief.

Of course with such promoters it is necessary for the continuance of such a high position that they preserve what cost so much work and worry and time to secure. Confidence is a plant of slow growth; and a London promoter that can induce such trust and belief must have years of honest, honorable, intelligent and satisfactory work behind him. He has to be continually careful of his name and reputation; he must indorse nothing but what seems to him a gilt-edged proposition and must tell the truth about it. He must do a good many expensive things; he must be in touch with likely investors; know the town and country thoroughly, and be in a position to stand by what he says and even, at times, take care of the stock after actual issuance in case of a scare. He must keep out of questionable situations, and not allow failure to be connected with his name. When such a London promoter is found—and there are a few of the genus—he is a shrewd, conservative, honorable man, who is slow in promises, certain in performance.

Naturally he wants to make money, and if the thing proffered is big enough or apparently profitable enough he will look it over and say yes or no at his leisure. He will also want a big slice of it; indeed, may be willing to give the foreign owner the slice and take the rest. He does not ask the American or the Australian or the Mexican to guarantee profits. He says, "We will give you so much (or so little) for your property. What we get out of it or sell it for is our business." There is no sentiment about him. He hasn't any more than the average share of insular prejudice against anything not fortunate enough to be under the British flag, and is about as square a citizen as any. The only thing he wants to be sure of is, "Is there a good, big profit in this thing for me, and a certain minimum profit of 5% in it for the investor?" If he finds that the property is being peddled around London he stops at once and declines further consideration of it.

Of course, this applies solely to the class of promoters in mind. As everywhere else, there are gold brick men in London, just as good as the genuine so far as surface appearances go—full of gas, glare and dazzle; specious and brazen; with promises and assurances and requests for advance money; with fine offices and ability to prepare a false prospectus. There are mock promoters just as there are mock mine managers and mock experts. Counterfeits of good money are co-existent with current coin everywhere.

Concentrates.

ICE, like any other solid, may be made colder than 32° F.

"ASSAY EVERYTHING" is a good rule for the prospector.

ENGLISH GOLD COINS have one-twelfth copper alloy; American, one-tenth.

PROBABLY a fair average of the general cost of crushing ore would be $1 per ton.

ONE HUNDRED INCHES WATER falling 100 feet give a theoretical energy of 28 H. P.

ALUMINUM would be about twice as strong at 300° F. below zero as at ordinary temperature.

THE average amperage of an arc lamp is 9.6 amperes; of an incandescent lamp, one-half ampere.

CALLIUM, the rarest metal, is produced electrolytically, and is 230 times as expensive as gold.

GALLIUM is too rare a metal to have any commercial value beyond that attached to a chemical curio.

THE foreign postage on each issue of this paper is 3 cents. The price per year, foreign, is now $4.50.

TO ANNEAL TOOL STEEL heat it red hot; then bury it in slaked lime or wood ashes, and allow it to cool.

IT is believed that the loss of gold in water used in stamp milling is too infinitesimal to be taken into account.

CARBONATE OF SODA is the best remedy for boiler incrustations of carbonate of lime or sulphate, or both together.

THE chemicals used in the Stevens process are: Chloride of lime, nitric acid, muriatic acid, bromide of potash, chloride of sodium.

AN illustrated description of the Poetsch system of sinking a shaft through quicksand, etc., appeared in the issue of March 31, 1900.

STORIES of ghosts in mines are numerous and often given credence, but miners have mostly seen too many ghosts to believe in them.

THE standard of a foot of fuse is thirty seconds. The estimate that a foot of fuse will take one minute to burn is a dangerous one in practice.

THE silver bullion now in the Government vaults cost the Government 92.4 cents per ounce. Considerable silver coinage constantly goes on.

HYDROGEN can be readily produced by the action of hydrochloric acid on zinc. The temperature of an oxyhydrogen flame is about 4000° F.

IN the last "Concentrate" in the first column on page 59 of the issue of Jan. 26 the word "molybdenum" should have been "wolframite."

ANYTHING in amalgamation that saves quicksilver saves gold. Wherever the quicksilver goes (except in volatilization) the gold goes with it.

A 5-INCH PIPE (actual inside diameter 5.045 inches) 10 feet long contains 2398.8 cubic inches. The area of the outside surface is 2.097 square inches.

WHEN the cyanide solution contains much copper it is precipitated on the zinc before the gold, coating it and retarding the precipitation of the latter.

A STANDARD candle power, a unit of light, one candle, is the light given out by a sperm candle, weighing six to the pound and burning 120 grains per hour.

IN a tank 4×4 inches at the bottom, 12×12 inches at the top, 10 feet high, the water stands 7 feet and sixtenths of an inch deep when tank is half full.

THE Stevens process is not considered a financial or commercial success. It is interesting, metallurgically—a distinction which it shares with other "processes."

THE Comstock Tunnel Co. long since succeeded to the rights of the Sutro, Nevada, tunnel. Their bonds are at present quotable in New York City at about 5 cents.

A PIECE of brass, 1 inch long, on heating it 1° F., will expand 0.0000104 inch; aluminum, 0.0000136 inch; lead, 0.0000163 inch; tin, 0.0000124 inch; zinc, 0.0000162 inch.

THE required vacuum in inches to remove all atmospheric pressure can be found by dividing the latter by .49. At sea level it is 14.7 pounds, and 14.7 ÷ .49=30 inches.

AT the Golden Cross 100-stamp mill at Hedges, San Diego county, Cal., the average yield of the 400 tons daily crushed is $3 per ton; average cost of treatment, 74 cents per ton.

THE average cost of carrying material upon common roads with animal power is, approximately, 25 cents per ton per mile, ½ cent per ton per mile on steam railroads and 1 mill by water.

IF the apex of a vein crosses one end line and one side line of a lode mining claim as located thereon, the locator of such vein can follow it upon its dip beyond the vertical side line of his location.

THERE is nothing statutory to prevent anyone writing "M. E." after his name, and claiming to be a mining engineer, though those who have a just claim to that title are often rightly indignant at its gross misuse.

SINCE the first of this year the American Smelting & Refining Co. has not bought any British Columbia lead-silver ore. It is understood that the renewal of the former contracts depends upon satisfactory settlement of freight rates on ores between the managers of the trust and the Canadian Pacific Railway.

THE Secretan copper corner was an attempt by a French syndicate engineered by M. Secretan in 1888 to control the world's copper output, the price being forced from $190 to $520 per ton. The scheme collapsed in March, 1889.

PROPERLY roasted, there need be no insuperable obstacle to successful chlorination of gold ore carrying 3% each of antimony, zinc and arsenic, though thorough and exhaustive tests of a "mill run" would be well before considering a plant.

THE thickness of a standard iron, lap-welded tube is .109 inch; the internal diameter is 3—(.109×2)=2.782 inches, and the internal diameter 8.74 inches; in a 15-foot tube there would thus be 10.925 square feet, or .72833 square foot for each linear foot.

A MUFFLE FURNACE would be useful for roasting arsenical ores, where the oxide of arsenic is caught in condensing chambers and sold, for the roasting of sulphide of gold precipitate in chlorination, and for roasting gold-zinc slimes resulting from the cyanide process.

IN a double-compartment shaft 900 feet deep, with a double-cylinder engine, 60-inch stroke, ninety pounds steam, to lift six tons, the steel rope should be 1⅛ inches diameter; it would weigh two pounds to the foot, and would coil in two layers on an 8-foot drum 30 inches long.

MANY books on electricity and cognate topics are written to glorify the writers, rather than to afford information. A good way to get the rudimentary information requisite in practical life is to get some standard electrical journal in connection with practice with competent men.

AN ordinary magnifying glass can be used as a substitute for the lens in a camera, in taking landscapes, by making it opaque all but a small circle in the middle. A glass 2 inches in diameter should be covered except a circle ⅝-inch diameter in the center. With a larger opening, the center and edges of the picture would not be in focus.

IN sampling silver-lead bullion bars it may happen that samples taken by chipping out of the top and bottom of each bar would give a result less than the actual value of the bar, as that part of the bullion lying against the sides of the mold is liable to be richer in silver, of which none would be obtained in the top and bottom chip sample.

THERE are flumes in irrigating ditches in California, where the water carries considerable sediment, fitted with riffles and charged with quicksilver. One in Tuolumne county has been in use twenty-five years and has yielded $3000 in one year. Men have placed sheepskins with the wool on in muddy streams and cleaned up a living from them.

THE "silver plant" is found in Montana and the foothills of the Rocky mountains. Botanists call it "Eriogonum ovalifolium." Prospectors regard it as an indication of silver ore in the soil on which it grows. It grows in low, dense tufts and turf-like bunches, has small leaves coated with a thick white fur, and has a head of minute rose-colored flowers.

THE manufacture of Nevada borax is a simple process. "Cottonballs" in the eastern Nevada salt marsh valleys are found 3 inches under the soil; they average 4 inches diameter, and are scraped up into a wagon. At the works they are put into vats and boiled with soda, the water run off into settling tanks, the borax crystallizing on the sides and bottoms and on suspended zinc plates.

TAKING an average of say a dozen ore assays as the average value of the ore will always prove unsatisfactory, as the high assays will almost invariably make the apparent average value above what it really is. A mill run, from fair averaging sampling is quite a different thing; and while it may result much lower than the other method, will more nearly approximate the real value of the ore body.

COPPER PYRITES is easily scratched with a knife and crushes easily with a hammer. Iron pyrites does not scratch with a knife. Peacock copper is a chalcopyrite or mixture of iron and copper pyrites, oxidation forming the blue and purple tints. Red oxide (cuprite) is the most valuable of copper ores, and generally carries gold and silver. It is sometimes mistaken for cinnabar. Its specific gravity is 6; that of cinnabar, 8.

THE cracking of a crucible is due to the walls containing moisture, which with quick heating is changed into steam, which, unable to escape, takes on a tension that the walls of the crucible can not resist. It is advisable to heat the crucible slowly before use, that the moisture may evaporate; this previous heating to be done even though the crucible has been well dried out, and not used for melting, but kept in a damp or cold room.

THE service and life of a belt can be increased by applying with a brush a composition made with equal parts of red lead, black lead, French yellow and litharge mixed with boiled linseed oil and japan—enough to make it dry quickly. This will produce a finely polished surface. A coat of the same composition may be applied if the rubber gets peeled from the surface of the belt. Animal oils, grease and castor oil are injurious to rubber belts. Belts to be adjusted to the pulley should have the ends cut square and true and be cut shorter than the distance around the pulley by ⅛ to ¼ inch for every foot when measured with a tape—a steel tape is the best. They should be stretched as tightly as possible, and with wide belts this can be done best by the use of clamps secured firmly to each end of the belt. A belt of good quality, 6 inches wide and three ply thick, will stand a direct strain of 5000 pounds.

A MINING LOCATION, including assessments, is completed when mineral-bearing rock has been found in place at 10 feet, or greater distance; the boundaries of the claim clearly marked, and a record of the same filed with the proper recorder; no further work is required that year; but during the following year, commencing January 1st, after the location, the annual labor of $100 must be performed. The Act of Congress, 1880, Section 2, amending Section 2324 of the Revised Statutes of the United States, provides that the period within which the work is required to be done annually on all unpatented mineral claims shall commence on the first day of January succeeding the date of location of such claim.

ALUMINUM CABLES for long-distance electrical transmission are now in use in California, Washington and New York. Between Niagara Falls and Buffalo, N. Y., the Niagara Falls Power Co. is building a second transmission line, which, when in operation with the first line built, will supply the latter locality with 30,000 electrical H. P. The first of these lines consists of six copper cables—two three-phase systems—each cable having nineteen strands, on poles 75 feet apart. The second line, now building, is of aluminum, having 300,000 circular mils cross-section, thirty-seven strands to each cable. Being lighter than copper, it admits of placing the poles 112½ feet apart. When finished, both lines will be worked at 22,000 volts.

THE real, or intrinsic, value of gold is what a given weight of it will bring when it is exchanged for something else; the stamp of the Government mint adds nothing to the value of the gold in a coin—it acts simply as a Government assay certificate to certify that the piece so stamped contains a certain weight of gold. It is the weight of the gold alone that gives the coin its exchange value, and, what is the same thing, its money value; the names "dollar," "quarter-eagle," "half-eagle," "eagle" or "double-eagle" being used solely to indicate that the coin contains 23.22 grains of fine gold, or multiples thereof. In proof of this, if a gold coin is of "light" weight because of mutilation or abrasion from use, it is not exchangeable at its face value.

THE multiple-cylinder engine is considered more economical and efficient than a single-cylinder engine, chiefly because the extremes of temperature are more closely kept together. Steam at 200 pounds pressure has a temperature of 387° F.; at atmospheric pressure, 212° F.—a difference of 175° which the steam thus indicated has to pass through at every stroke of the piston. If a condenser is used and the temperature reduced to 160°, the difference becomes 227°—a big variation for the walls of a cylinder to pass through twice during each stroke of an engine. When this expansion by the use of three or four cylinders is cut up into as many parts, there is a corresponding division of difference in temperature, the advantage of which more than counterbalances the increased friction.

A U. S. PATENT for mineral land is obtained as follows: The claimant, having complied with all legal requirements, may file in the proper land office an application for a patent, under oath, showing such compliance, together with a plat and field notes of the claim or claims in common, made by or under the direction of the U. S. Surveyor-General, showing accurately the boundaries of the claim or claims, distinctly marked by monuments on the ground, and post a copy of such plat, together with a notice of such application for a patent, in a conspicuous place on the land embraced in such plat, previous to the filing of the application for a patent, and file an affidavit of at least two persons that such notice has been duly posted, and file a copy of the notice in such land office. Thereupon the claimant is entitled to a patent for the land in the manner following: The register of the land office, upon the filing of such application, plat, field notes, notices and affidavits, publishes a notice that application has been made, for a period of sixty days, in a newspaper to be by him designated published nearest to such claim; and he also posts such notice in his office for the same period. The claimant at the time of filing the application, or at any time thereafter within the sixty days of publication, files with the register a certificate of the U. S. Surveyor-General that $500 worth of labor has been expended or improvements made upon the claim by himself or grantors; that the plat is correct, with such further description by such reference to natural objects or permanent monuments as shall identify the claim, and furnishes an accurate description, to be incorporated in the patent. At the expiration of the sixty days of publication the claimant files his affidavit, showing that the plat and notice have been posted in a conspicuous place on the claim during such period of publication. If no adverse claim shall have been filed with the register and the receiver of the proper land office at the expiration of the sixty days of publication, it is assumed that the applicant is entitled to a patent, upon the payment to the proper officer of $5 per acre, and that no adverse claim exists; and thereafter no objection from third parties to the issuance of a patent can be heard, except it be shown that the applicant has failed to comply with the above terms.

Gold Precipitation From Cyanide Solutions.

Methods in use for the precipitation of gold from cyanide solutions are by means of zinc, either in the form of dust or shavings; by charcoal; by zinc thread, coated with lead and obtained by momentarily immersing the zinc in a solution of lead acetate; by electrolysis with various electrodes, such as the Siemens–Halske process, which uses iron anodes and lead cathodes; or the Andreoli patented process, consisting of peroxide of lead anodes and iron cathodes, the iron cathodes being immersed in a lead bath to take off the gold. There is also the Cowper–Coles method of aluminum cathodes, which gives good results on a small scale. In this the gold comes down up to a certain point very well, but afterwards aluminum hydrates and lime precipitate on the aluminum plates, interfering with further deposition of the gold. With pure solutions the method is commendable, the amount of aluminum consumed less than the amount of gold precipitated, in the ratio of 100 to 125. Cyanide solutions being alkaline, aluminum hydrate forms readily, and, of course, it would not do to use an acid solution, as the gold cyanide would separate out. Most of the research work is done on the ordinary alkaline cyanide solutions, which leaves very little scope for successful chemical reaction in the precipitation of gold. For example, one could not precipitate sulphate of iron, or oxalic acid, or stannous chloride. With acid solutions it is different, and there are various methods which work well theoretically and practically, but their adoption on a commercial basis would depend on the failure of the zinc, charcoal and electrical methods of precipitation.

Where there are very base solutions to treat, which contain copper or other metals which would deposit on the zinc first and prevent the gold adhering, or choked up the charcoal pores, other methods would have to be used. The cyanide liquors are weak in cyanide when they have acted on the gold and are easily acidified, the acid required being very small unless there are carbonates in solution. On acidifying the gold–cyanide separates out as a yellow precipitate, but on heating the solution by means of steam pipes the whole of the gold may be thrown down by stannous chloride as a brown powder, which quickly settles to the bottom of the vat. If there is any stannic chloride present, purple of cassius will be formed and the gold will be in a much finer state of division. The gold thus precipitated by stannous chloride can not be caught by mercury, as it will not readily amalgamate, so that if this method were used the gold could be allowed to accumulate at the bottom of the tank until a sufficient quantity was obtained for a clean-up.

Gold–cyanide is a stable salt, insoluble in water or single acids, and aqua regia attacks it slowly. It is not acted on by hydrogen–sulphide, but is soluble in alkaline sulphides, ammonia, sodium, hyposulphite and KCN, and is split up on boiling with KHO to $K\,Au\,(CN)_2$ and Au.

Another method which could be used for collecting the gold consists in adding a certain amount of lead acetate to the acidified cyanide solution, heating to boiling and then precipitating with H^2S (sulphuretted hydrogen), the gold completely precipitated and easily collected by the lead sulphide, the precipitate dried and assayed for gold in the ordinary way. This method is shorter when assaying very poor solutions for gold than the ordinary evaporation method, and might be adopted on a large scale and the auriferous lead–sulphide sold to smelters. Sulphate of copper might also be used instead of lead, and the resulting sulphide of copper roasted and treated with sulphuric acid, forming copper sulphate, and the gold would be in the residue. The gold in the precipitate may be in the form of sulphide or partly free gold, as there is always a little free sulphur, which would indicate a decomposition of something, not lead sulphide, but the gold is precipitated. Gold–cyanide ought to be decomposed by passing through filters of metallic sulphides: $2Au\,CN+PbS=Pb\,(CN)_2+2Au+S$, or by oxalic acid: $2Au\,CN+H_2\,C_2\,O_4=2Au+2HCN+2CO_2$.

It is difficult to get reliable results of charcoal precipitation. One compiler of experiments with the cyanide process mentions a plant where the charcoal extracted 95% of the gold, and the liquors leaving the plant only assayed two grains of gold per ton of solution, but in this case an auxiliary zinc box was probably used, and it is not stated how much gold was in the liquors when they left the charcoal towers. The charcoal method of precipitation is in operation at the Mount Morgan mine, Australia. The auriferous liquors obtained by the chlorination process are first passed through sand filters to take out any suspended slimes, which would block up the channel. These sand filters are round, lead-lined vats, with a false bottom of perforated wood, on which a layer is made of pebbles 4 inches deep, and then a layer of sand 8 inches deep. From these sand filters the liquors pass to the charcoal filters, which consist of vats provided with a perforated false bottom covered with a cheesecloth, on which rests a layer of 5 inches of coarse charcoal — that is, charcoal which will pass through a 20-mesh sieve, but not through a 30-mesh—and on this comes a layer of fine charcoal—that is, charcoal that passes through a 30-mesh sieve, but not through a 40-mesh —to a depth of 2 feet; on top of this is placed a layer of 5 inches coarse, the whole being covered with a sheet of perforated lead, weighted to keep the charcoal from floating. The charcoal is stamped down tightly, especially around the sides. The greatest deposition of gold is said to take place in the upper layer of the fine charcoal. The liquors on passing the charcoal filters still contain a trace of gold, so they are passed through an auxiliary filter of sifted sawdust, and after leaving this filter they are stated to be absolutely free from gold. The sawdust is burned every six months, and the product, being chiefly oxide of iron, containing from 200 to 300 ounces of gold per ton, is sold to smelters.

The charcoal is burned off in a small reverberatory and the resulting ash is smelted with soda ash, sand and borax in graphite crucibles. The question is whether the sawdust filter would take the last traces of gold out of a cyanide solution as it does out of a chlorine solution. It is easier to decompose chloride of gold than cyanide of gold. In this country the charcoal precipitation is not in as much favor as zinc. On this subject Philip Argall says: "Zinc, in the form of shavings, and also zinc dust, is used to precipitate gold, the latter, we believe, being preferable when adapted as a continuous process, more especially as the action is quicker and less zinc is required per ounce of bullion precipitated, and for solutions running from 0.05% cyanide upwards, and low in gold, it is likely to continue the best precipitant for a considerable time to come." He also discredits the notion that zinc in the KCN solution has any very great influence on the solvent power. There seems to be an idea among some metallurgists that charcoal destroys more KCN than zinc. This may be so with strong solutions, but hardly so with the very weak solutions now used. Theoretically, the consumption is the same, as the following equations show:

$$(1)—K\,Au(CN)_2+C+2H_2O=Au+2HCN+KHO+H+O.$$

$$(2)—3K\,Au\,(CN)_2+Zn+2H_2\,O=Au_3+2HCN+KHO+H+O+K_2Zn(CN)_4.$$

Electrolytic action takes place in both cases through the formation of couples by the precipitant and solution, water being slightly decomposed and hydrogen and oxygen being evolved. The hydrogen escapes free, but the oxygen combines with the HCN to form HCNO. Some authorities say that the hydrogen is caused by the action of the KHO on the zinc, but this explanation will not answer for the charcoal precipitation, as there is no chemical action on charcoal with KHO, as there is on zinc, so that electrolytic action is the only solution. Charcoal with weak solutions will in some localities always be favored in comparison with electrolytic methods, on account of its simplicity of working and satisfactory extraction with warm solutions.

Los Angeles, Cal., Items.

James Irving of Los Angeles has just returned from a three days' trip to Catalina island, whence he brought samples of gold-bearing galena from properties owned by the Cheny Valley Silver & Lead M. Co. of San Pedro. The mines from which these samples were taken are old workings, 18 miles northwest of Avalon.

C. A. Burcham of the Yellow Aster mine, Randsburg, has gone to San Francisco. His new 100-stamp mill is nearing completion.

W. T. Smith of Los Angeles, who has handled considerable of the output of the Coolgardie diggings, which are located 25 miles northeast of Barstow, states that from dry washings before the rain there was a weekly product of from $1500 to $2000, and before long this will reach $5000 to $10,000 weekly. Mr. Smith considers this one of the best gold placer finds that has taken place in southern California during the past fifteen years.

Los Angeles, Jan. 26, 1901.

Technical Societies.

The seventh annual meeting of the Lake Superior Mining Institute will be held in the "Copper Country," with headquarters at Houghton, March 5, 6, 7 and 8, 1901.

The Technical Society of the Pacific Coast, Academy of Sciences, San Francisco, has elected the following named officers: President, Chas. D. Marx; vice-president, David C. Henny; secretary, Otto von Geldern; treasurer, Edward Schild; directors, Paul W. Prutzman, Samuel C. Irving, Luther Wagoner, Adolf Lietz, Edward F. Haas.

The eightieth meeting—thirty-first annual meeting—of the American Institute of Mining Engineers will be held at Richmond, Va., beginning Feb. 19th.

THE advantages of the electric firing of explosives, from the standpoint of accuracy and safety, are shown in the experience of German collieries, as recorded in an official report. In one colliery no misfire occurred out of 1663 shots fired; in five other collieries of the district there were 548 misfires out of the total of 34,207 shots, a proportion of 1.6%.

Cornish and Direct-Acting Duplex Pumps.*

Written by J. RENSHAW, Denver, Colo.

The following comparisons of the relative advantages of the higher grades of direct-acting, duplex steam pumps, as compared with the old and well-tried Cornish system, refer to permanent pumping plants for mines in which the water is below the temperature of about 70° or 75° Fahr. When the water is above that temperature it is evident that the exhaust steam from the direct-acting steam pumps cannot be advantageously disposed of, and either the Cornish pump or some other plan, in which the motive power is located at the surface, must be used.

Up to 1878 one of the various modifications of the Cornish pump was exclusively used, both in Europe and in this country. In that year a simple cylinder, non-condensing, single-plunger pump at the Ontario mine, Utah, with 12-inch plungers, 7-inch stroke, and 500 feet vertical lift, was altered into a compound, condensing pump by the addition of an expansion cylinder and a spool-shaped bushing put in the original cylinder, the space between the original bore and the outside of the bushing forming a steam jacket. This pump was, we believe, the first attempt toward a higher grade direct-acting steam pump located in lower workings for permanent mine pumping. It was thoroughly tested first by the writer and then by the designer of a Cornish pump which had been selected by the writer to be put in should the other not prove economical. It met with strong opposition, mainly from the builders of the Cornish pumps, both in California and the East, and with much skepticism of Eastern mine operators, principally, we think, with the belief that steam could not be conducted in pipes a long distance without a ruinous loss by condensation, and this idea held among many not familiar with the results of the compound, direct-acting, condensing steam pumps that had been put in, until 1884 and 1886, when they were put in a mine at Leadville and in one in Ishpeming, Mich., since which time very few Cornish pumps have been built in this country.

In 1882 or 1883 a Cornish pump was built for the Ontario mine, which is no doubt the best example of that style of pump built, at least in this country. The writer had no opportunity to test it, but the manager of the mine said that he thought it saved a little in steam over the crude, direct-acting, condensing steam pumps that had been installed in that mine. When asked if he was sure as to saving any steam, he replied that he was not, and later advised a mine operator in Leadville to put in the direct-acting, duplex condensing pump as against the Cornish pump, as the difference in cost more than balanced the possible saving in steam.

We know of no publicly reported experiments having been made to determine the amount of condensation in steam pipes until a series was made by the New England Board of Underwriters, and reported in the transactions of the American Society of Mechanical Engineers. The result then had on pipes covered with 1 inch of hair felt, and that by a thickness of burlaps, coincided almost exactly with what we had determined at the Ontario mine with the same thickness of hair felt covered with 10-ounce canvas. At the Wolftone mine at Leadville the condensation in 585 feet of 4-inch wrought iron pipe, covered with $\frac{1}{16}$ inch of asbestos paper, 1 inch of hair felt, and this covered with painted 10-ounce canvas, was 57.75 cubic inches per minute, or 8.396 cubic inches per minute for each hundred square feet of external pipe surface.

Judging by past experience, there is little difference in "duty" between the best examples of Cornish pumps and the best examples of direct-acting, compound condensing pumps, each for, say, 1000 gallons per minute lifted 1000 feet vertically.

With triple-expansion, direct-acting condensing pumps with the initial steam pressure at the pump at 140 pounds, and the pump running at, say, 125 feet piston speed, the comparison would undoubtedly be much in favor of it over the Cornish pump.

There are, however, other very important considerations to the mine operator as to the relative advantages of the two systems of pumping, besides a little difference in the steam economy. On a basis of 1000 gallons lifted 1000 feet per minute the installed cost of the direct-acting pump will not reach 10% of that of the Cornish pump. In most cases the working out of the mine beneath the foundations of the Cornish pump engines will, by settlement, throw it out of line, it not being a self-contained machine like the direct-acting pump. So, also, with the "pit work."

Another very important consideration is the expansibility—if we may so call it—of the two systems. When the size of a Cornish pump is to be determined, a large margin for increase of water through greater depth or side workings has to be allowed for, and what this margin is to be is difficult to determine. As a rule, but one Cornish pump can be installed in the one-pump compartment of the shaft and it cannot be replaced by another without allowing the shaft to be flooded; and it is a question if it could be

* Bulletin No. 18, California State Mining Bureau.

taken out as fast as the water would rise. This would depend upon the amount of ground worked out. Frequently there is allowed a greater margin for increase of water than afterwards proves necessary, either from the ore body giving out or less water being encountered than expected. The interest on investment and wear and tear of a larger machine than necessary are important considerations; or it may be years before the full capacity of the pump is called for. On the other hand, if too small a pump is put in, a new shaft has to be put down in which to install another and larger pump. Thus the size of the pump has to be determined once for all.

Not so, however, with the direct-acting pump. They need only be bought as depth is attained or increase of size becomes necessary. If the pump proves too small, a larger one may be installed on the pump station and the smaller one moved down to a lower level, where less ground has been opened, and so on, making pump stations every 500 or 1000 feet. If the column pipe for the first pump put in is not of sufficient size for the larger pump, there is generally room enough to put in a larger one, and the smaller pipe can then be used below for the smaller pump. The expenditure for pumps may thus be by increments as needed.

As we have said, pump shaft compartments are seldom large enough to install but one Cornish pump line, and "the eggs are all in one basket," whereas with direct-acting pumps two may be installed in the one station, both connected to one column pipe or each with its own, and in case of necessary repairs one may be stopped and the other started. It is very comfortable for the mine operator to feel thus secure.

If there are two or more compartments to the shaft, one of which is for pump, piping and ladders, that compartment should be well bratticed from the adjoining hoisting compartment. The heat radiated from even the well-covered steam pipe tends to make that compartment an "uptake" and the hoisting compartment a "downtake," and thus fairly good ventilation is to be had in the pump station or level.

We need hardly say that it is important to keep pipes and their bearers snugly to the sides of the shaft, so that there will be left a clear run for the rising of warm or foul air.

When, through the decomposition of pyrites or other minerals the water is too hot for the condensation of steam below, then either compressed air may be substitted for steam, electric or rope-driven power pumps, or the Cornish pump must be used. With the utilization of mountain streams as a source of power, and either electricity or compressed air to transmit it, comes a new feature in mine pumping which will be more and more used, as in most of the metal mining locations the cost of fuel is a "burning" question. The transmission of power to the station pump by electricity would present a simple solution of the difficulty were it not that the speed of the pump has to be varied, either because of increase of water by ground opened or by the seasons affecting the surface water. We think this difficulty can be overcome without uselessly expending power.

The above is given as a summary of the relative advantages of the two systems of mine pumping, for a part of which we have to rely upon memory, but we are substantially correct.

Chlorination at Mount Morgan, Queensland.

At the new West Works, which treats 100,000 tons per annum, the low grade gold ores are extracted with a previously prepared solution of chlorine in water, and are not gassed as in ordinary methods. In "Proceedings of the Institute of Civil Engineers," E. W. Nardin describes the plant, which consists of sixteen vats of 100 tons capacity each, four chlorine stills, four towers, four solution tanks, four gold liquor tanks, twelve charcoal filters, three vacuum pumps, three force pumps, and one driving engine. The chlorine is made from salt, manganese dioxide, and sulphuric acid, manufactured at the company's works from imported sulphur. The gas from the stills is dissolved in water trickling over pieces of glass, with which the towers are filled. The solution runs into the storage tanks, which are covered in at the top and locked by pipes and valves in the base operated from above. The vats have a wooden perforated false bottom and layers of gravel and sand of diminishing size are laid upon it. The internal dimensions are 60x11 feet with a depth between 5 feet at one end and 5½ feet at the other; 1½ feet of the depth is occupied by the prepared gravel bed. The ore is thrown in on this bed and the chlorine solution run in over it. The gold liquor is drawn through and out from below by a small vacuum of five pounds per square inch, and passed on to the storage tanks. Fresh chlorine solution is run in until the exit liquor contains plenty of free chlorine, when the ore is washed through with water. The gold is precipitated by passing the liquor through a 2-foot bed of crushed charcoal lying on a cloth on the wooden perforated bottoms of the filtering vats, the charcoal being afterwards burnt and the ashes smelted. The cost worked out during one month at $0.0645 per ton, with ore of the average assay of 13 grains. The residue contained 22 grains, showing an extraction of 92.06%, the quantity of ore treated being 9852 tons. The cost of the chlorine was 11.85 cents per pound, and the weight used per ton of ore was 2.51 pounds, the time under solution being thirty-three hours, and under water thirty-five hours. The average weight of chlorine per cubic foot of solution was 620 grains, and the still efficiency 72.59%. The richer sulphide ores, containing about four ounces of gold per ton, at the top works are, after roasting, treated by the same process, and show an extraction of 95% with a consumption of 11.47 pounds of chlorine per ton of ore. A new plant to treat 2000 tons of low grade sulphide ore per month is nearing completion.

Cyaniding Rock in Place.

"A little nonsense now and then
Is relished by the wisest men."

We are working a quartz ledge in the Salmon mountains of Siskiyou county, California, and our postoffice is Callahans, 50 miles from the mine. For obvious reasons, it will be understood why I do not locate the claim definitely. "There is me, and the cook, and the Portugee bold," to say nothing of Quo Vadis the mule, Cyrano the dog, and Taddles the cat. The snow is 10 feet deep on the level, and the new century is here. The Portugee is bewailing his fate: "Notra dam turk', notra dam Tom an' Jer', notra dam ting 'cept ham an' bac', an' snow, an' work-work-work!" He is too lazy to showshoe it out, and moreover, as we have but embryo bullion, which he declares to be bogus, and will have none of, what can we do toward paying him off? Neither old Joe nor I believe Manuel desires to leave. We have fired him several times during the past five years, paying him in coin of these U. S., or in I. O. U.'s, as the case might be, and after a howling week of jag at the nearest camp the Portugee, accompanied by R. E. Morse, has found himself again under our vine and fig tree (i. e., tunnel and shake roof), begging for "one dose de good-a bromo."

But I digress. This is the story of a new (?) process in gold mining, not the incidents of a Portugee's periodicals.

The snow is so deep, the wind so painfully mournful through the pines; there is such a lack of congeniality between men shut up in a cabin that I'm garrulous, even on paper.

Two years ago we found the Pizen Dog claim while digging a water hole above a spring. It did not crop, and the foot of quartz between diorite walls panned a good string of flour gold, so fine that it floated when the water was off the prospect for a moment, but it was good to look upon—a hundred-dollar prospect. We covered it, blazed some trees in a circle around the hole, and kept on our weary march northward, for we had the genuine and only Simon Pure map and description of the Lost Cabin claim, dated A. D. 1855, which Manuel's grandfather upon his deathbed had bequeathed to us while in Mexico—"but that's another story"—and the translation gave the most minute details; so we were sure of finding the diggings. Let me state here in parenthesis that the Lost Cabin placer mine, upon the headwaters of the Trinity river, was worked by two Portugees in the early fifties, and they took out all they could stagger under. One died with D. T. in San Francisco, the other was shanghaied. Manuel's grandfather's brother returned to Mexico broken in health, but the priest took his description of the mine and we have the original document.

You will say it was another "lost mine." It was, but we found it!—found it without the slightest trouble, and it paid as high as fifty ounces per day per man. Not to us—no such luck—but to some fortunate miners who stumbled upon it in the sixties and who worked out the little draw.

We had come 2000 miles and were flat broke, so while old Joe opened a set of books for a store, and Manuel dealt monte and hokey-pokey, I ran an arrastra for a farmer. In two months we had a stake to take us back to the Pizen Dog of the Salmon river.

The prospect was as we left it. We built a wickiup and started a tunnel to crosscut, that in 70 feet gave us backs of 50 feet upon the ledge which we followed, saving the ore.

We built a small arrastra, and Quo Vadis the mule worked a week, when the mine and gulch went dry—not enough water to drink, and the river two miles distant.

The vein is peculiar in some respects. The cleavage is horizontal and the quartz lies in ribboned layers with vertical minute open oxidized seams that carry the free gold. The matrix is apparently barren and the seam colors so fine that panning must be done under water; strike east and west; dip vertical; walls close, hard diorite.

Summer was upon us, so we cleaned up the arrastra. The yield was generous, for the ore was hand sorted. Manuel was sent for supplies to Cecilville, and old Joe and I began developing the pay chimney. We had 35 feet of drifts upon the ledge, when one morning old Joe threw down his hammer and danced out of the tunnel shouting, "By the shinbone of my paternal ancestor, I have it—Eureka!"

Men living in the mountains get "off" easily, so I held on to my drill and followed him out, trusting I would not have more than temporary persuasion upon my hands. There he was, hornpiping it, bareheaded, under a sun of 105° F.

Poor old Joe. We have been partners, broke and affluent in several lands for twelve years, but I never saw him other than the staid and taciturn old Heidelberg student of metallurgy. He waved his arms and shouted, "Holy smoke, and we've been trying to amalgamate it! Blockheads! Stoughton Bottles! It's morogonous!"

"You see," he yelled, "2 Au plus 4 KCy plus O plus H_2O equals 2 Au KCy_2 plus 2 KOH, and that's a lovely equation!"

"Come along, old man, that's a good fellow." He was worse than I feared, babbling chemistry synonyms, and if Manuel had been there we could have strapped him down till the first flush of delirium was over.

Again he shouted, "But 2 $KAu\ Cy_2$ plus Zn, me bucco Ananias, yields $K_2\ Zn\ Cy_4$ plus 2 Au—wow! And she's dry as a bone—percolation perfect!" Again he gave a warwhoop and waved his arms.

"Look here," I yelled, shaking him by the arm, "you come along with me and take a good dose of Manuel's bromo, and a sleep, and you'll—"

"What t'ell's matter with you? I've got it, I tell you—got it pat—the Pegleg and the Lost Cabin will be nothing to the case of purging the Pizen Dog. We'll give him the gold cure!" and he ambled again.

I sat in the shade and wiped my forehead. I think I wept a little. I was sick all over, but old Joe noticed my agitation and came to me.

"Just let me think it out," he said. "It's here, back in the gray matter all right, and bound to come in time. Resurgam!"

I lighted my pipe, but I never dropped the 2-foot drill. I sweat cold all over, but his next remarks sent me to my feet. "She is dry, isn't she? And the gold is free in the seams? We have 50 feet of backs, and 35 feet blocked out, say 125 tons at $100, equals $12,500. Now, why not pour on a cyanide solution, catch it in the drift, drain it into a vat, and precipitate it upon zinc shavings? It will work for us while we sleep, and it is worth trying."

We did no further physical work that day, but the strain upon our mental caliber was tense, and the pro and con resulted in my leaving for Cecilville to round up the mule and Manuel. The latter I alternately kicked and ducked into sobriety, for he was "loaded for bear," and the former I saddled and headed for the railroad 75 miles distant.

Old Joe and Manuel dug a trench along the surface of the shoot over the drift, made a set of receiving tanks, a pump, boxes for the zinc, and built a snug log cabin.

In three weeks I returned. The sample sent to the city assayed $198.75 per ton, and by laboratory test 96½% was saved by the cyanide process. The cyanide, zinc, acids, treatises and grub were carefully packed in by Quo Vadis, and I was footsore and weary, but the first remark of old Joe tired me more: "Did you find how much royalty we have to pay to the patentees?" I had not, so we let it go at that and set to work.

With a makeshift plow we dug a small ditch 2½ miles long, and in five weeks had a trickle of water on the claim. We then carried a strong solution into the adit and held our breaths. Nothing percolated. The tunnel was as dry as a bone. We took turns and watched all night, and the drifts were, if anything, drier than ever. More solution, more examining, more wondering. We kept a steady flow into the adit, which absorbed it readily enough, and upon the third day the roof became wet in patches, then the drip came. We carried it in a trough to the mouth of the tunnel and into the zinc boxes. The trick was done, and the brown residue, slimy and uninteresting, was dried and carefully saved. Manuel was more excited than either of us, and his disgust upon seeing what we called gold was painful.

We worked for a month and then came on heavy rains, and cold weather followed fast. We made an upraise of 10 feet into the ledge, and apparently there is as much gold as before, in the seams, not acted upon by the solution, though the weight of our residue assures us that we have a generous return for our summer's work, and old Joe suggests renaming the mine the Widow's Cruet. Next spring we will attempt a totally new scheme for working the ledge and for saving values, and our dead work will be complete by the time the snow is off.

A CALIFORNIA MINER.

Callahans, Siskiyou Co., Cal., Jan. 15, 1901.

WOVEN WIRE GAUZE AND CLOTH is now made with meshes so infinitesimal as to number 40,000 of the latter to a single square inch. The more delicate classes of wire—those which stand related to scientific instruments—are of such fineness as to render their measurement a matter of difficulty; this task, however, has been made practicable, and platinum wire has been drawn $\frac{1}{7000}$ of an inch and to even greater fineness. Aluminum wire, too, has been drawn as fine as 10,500 yards to the ounce, a size too fine to be measured practically by any gauge or instrument. Iron has also been so attenuated that over 2½ miles in length weighed only one ounce; a more remarkable instance of this class of mechanical manipulation is the drawing of twenty-four grains of gold on a silver wire to 120 miles.

Gold Precipitation From Cyanide Solutions.

Methods in use for the precipitation of gold from cyanide solutions are by means of zinc, either in the form of dust or shavings; by charcoal; by zinc thread, coated with lead and obtained by momentarily immersing the zinc in a solution of lead acetate; by electrolysis with various electrodes, such as the Siemens-Halske process, which uses iron anodes and lead cathodes; or the Andreoli patented process, consisting of peroxide of lead anodes and iron cathodes, the iron cathodes being immersed in a lead bath to take off the gold. There is also the Cowper-Coles method of aluminum cathodes, which gives good results on a small scale. In this the gold comes down up to a certain point very well, but afterwards aluminum hydrates and lime precipitate on the aluminum plates, interfering with further deposition of the gold. With pure solutions the method is commendable, the amount of aluminum consumed less than the amount of gold precipitated, in the ratio of 100 to 125. Cyanide solutions being alkaline, aluminum hydrate forms readily, and, of course, it would not do to use an acid solution, as the gold cyanide would separate out. Most of the research work is done on the ordinary alkaline cyanide solutions, which leaves very little scope for successful chemical reaction in the precipitation of gold. For example, one could not precipitate sulphate of iron, or oxalic acid, or stannous chloride. With acid solutions it is different, and there are various methods which work well theoretically and practically, but their adoption on a commercial basis would depend on the failure of the zinc, charcoal and electrical methods of precipitation.

Where there are very base solutions to treat, which contain copper or other metals which would deposit on the zinc first and prevent the gold adhering, or choked up the charcoal pores, other methods would have to be used. The cyanide liquors are weak in cyanide when they have acted on the gold and are easily acidified, the acid required being very small unless there are carbonates in solution. On acidifying the gold-cyanide separates out as a yellow precipitate, but on heating the solution by means of steam pipes the whole of the gold may be thrown down by stannous chloride as a brown powder, which quickly settles to the bottom of the vat. If there is any stannic chloride present, purple of cassius will be formed and the gold will be in a much finer state of division. The gold thus precipitated by stannous chloride can not be caught by mercury, as it will not readily amalgamate, so that if this method were used the gold could be allowed to accumulate at the bottom of the tank until a sufficient quantity was obtained for a clean-up.

Gold-cyanide is a stable salt, insoluble in water or single acids, and aqua regia attacks it slowly. It is not acted on by hydrogen-sulphide, but is soluble in alkaline sulphides, ammonia, sodium, hyposulphite and KCN, and is split up on boiling with KHO to $K\,Au\,(CN)_2$ and Au.

Another method which could be used for collecting the gold consists in adding a certain amount of lead acetate to the acidified cyanide solution, heating to boiling and then precipitating with H^2S (sulphuretted hydrogen), the gold completely precipitated and easily collected by the lead sulphide, the precipitate dried and assayed for gold in the ordinary way. This method is shorter when assaying very poor solutions for gold than the ordinary evaporation method, and might be adopted on a large scale and the auriferous lead-sulphide sold to smelters. Sulphate of copper might also be used instead of lead, and the resulting sulphide of copper roasted and treated with sulphuric acid, forming copper sulphate, and the gold would be in the residue. The gold in the precipitate may be in the form of sulphide or partly free gold, as there is always a little free sulphur, which would indicate a decomposition of something, not lead sulphide, but the gold is precipitated. Gold-cyanide ought to be decomposed by passing through filters of metallic sulphides: $2Au\,CN+PbS=Pb\,(CN)_2+2Au+S$, or by oxalic acid: $2Au\,CN+H_2\,C_2\,O_4=2Au+2HCN+2CO_2$.

It is difficult to get reliable results of charcoal precipitation. One compiler of experiments with the cyanide process mentions a plant where the charcoal extracted 95% of the gold, and the liquors leaving the plant only assayed two grains of gold per ton of solution, but in this case an auxiliary zinc box was probably used, and it is not stated how much gold was in the liquors when they left the charcoal towers. The charcoal method of precipitation is in operation at the Mount Morgan mine, Australia. The auriferous liquors obtained by the chlorination process are first passed through sand filters to take out any suspended slimes, which would block up the channel. These sand filters are round, lead-lined vats, with a false bottom of perforated wood, on which a layer is made of pebbles 4 inches deep, and then a layer of sand 8 inches deep. From these sand filters the liquors pass to the charcoal filters, which consist of vats provided with a perforated false bottom covered with a cheesecloth, on which rests a layer of 5 inches of coarse charcoal — that is, charcoal which will pass through a 20-mesh sieve, but not through a 30-mesh—and on this comes a layer of fine charcoal—that is, charcoal that passes through a 30-mesh sieve, but not through a 40-mesh —to a depth of 2 feet; on top of this is placed a layer of 5 inches coarse, the whole being covered with a sheet of perforated lead, weighted to keep the charcoal from floating. The charcoal is stamped down tightly, especially around the sides. The greatest deposition of gold is said to take place in the upper layer of the fine charcoal. The liquors on passing the charcoal filters still contain a trace of gold, so they are passed through an auxiliary filter of sifted sawdust, and after leaving this filter they are stated to be absolutely free from gold. The sawdust is burned every six months, and the product, being chiefly oxide of iron, containing from 200 to 300 ounces of gold per ton, is sold to smelters.

The charcoal is burned off in a small reverberatory and the resulting ash is smelted with soda ash, sand and borax in graphite crucibles. The question is whether the sawdust filter would take the last traces of gold out of a cyanide solution as it does out of a chlorine solution. It is easier to decompose chloride of gold than cyanide of gold. In this country the charcoal precipitation is not in as much favor as zinc. On this subject Philip Argall says: "Zinc, in the form of shavings, and also zinc dust, is used to precipitate gold, the latter, we believe, being preferable when adapted as a continuous process, more especially as the action is quicker and less zinc is required per ounce of bullion precipitated, and for solutions running from 0.05% cyanide upwards, and low in gold, it is likely to continue the best precipitant for a considerable time to come." He also discredits the notion that zinc in the KCN solution has any very great influence on the solvent power. There seems to be an idea among some metallurgists that charcoal destroys more KCN than zinc. This may be so with strong solutions, but hardly so with the very weak solutions now used. Theoretically, the consumption is the same, as the following equations show:

$$(1)—K\,Au(CN)_2+C+2H_2O=Au+2HCN+KHO+H+O.$$

$$(2)—3K\,Au\,(CN)_2+Zn+2H_2\,O=Au_3+2HCN+KHO+H+O+K_2Zn(CN)_4.$$

Electrolytic action takes place in both cases through the formation of couples by the precipitant and solution, water being slightly decomposed and hydrogen and oxygen being evolved. The hydrogen escapes free, but the oxygen combines with the HCN to form HCNO. Some authorities say that the hydrogen is caused by the action of the KHO on the zinc, but this explanation will not answer for the charcoal precipitation, as there is no chemical action on charcoal with KHO, as there is on zinc, so that electrolytic action is the only solution. Charcoal with weak solutions will in some localities always be favored in comparison with electrolytic methods, on account of its simplicity of working and satisfactory extraction with warm solutions.

Los Angeles, Cal., Items.

James Irving of Los Angeles has just returned from a three days' trip to Catalina island, whence he brought samples of gold-bearing galena from properties owned by the Cheny Valley Silver & Lead M. Co. of San Pedro. The mines from which these samples were taken are old workings, 18 miles northwest of Avalon.

C. A. Burcham of the Yellow Aster mine, Randsburg, has gone to San Francisco. His new 100-stamp mill is nearing completion.

W. T. Smith of Los Angeles, who has handled considerable of the output of the Coolgardie diggings, which are located 25 miles northeast of Barstow, states that from dry washings before the rain there was a weekly product of from $1500 to $2000, and before long this will reach $5000 to $10,000 weekly. Mr. Smith considers this one of the best gold placer finds that has taken place in southern California during the past fifteen years.

Los Angeles, Jan. 26, 1901.

Technical Societies.

The seventh annual meeting of the Lake Superior Mining Institute will be held in the "Copper Country," with headquarters at Houghton, March 5, 6, 7 and 8, 1901.

The Technical Society of the Pacific Coast, Academy of Sciences, San Francisco, has elected the following named officers: President, Chas. D. Marx; vice-president, David C. Henny; secretary, Otto von Geldern; treasurer, Edward Schild; directors, Paul W. Prutzman, Samuel C. Irving, Luther Wagoner, Adolf Lietz, Edward F. Haas.

The eightieth meeting—thirty-first annual meeting—of the American Institute of Mining Engineers will be held at Richmond, Va., beginning Feb. 19th.

THE advantages of the electric firing of explosives, from the standpoint of accuracy and safety, are shown in the experience of German collieries, as recorded in an official report. In one colliery no misfire occurred out of 1663 shots fired; in five other collieries of the district there were 548 misfires out of the total of 34,207 shots, a proportion of 1.6%.

Cornish and Direct-Acting Duplex Pumps.*

Written by J. RENSHAW, Denver, Colo.

The following comparisons of the relative advantages of the higher grades of direct-acting, duplex steam pumps, as compared with the old and well-tried Cornish system, refer to permanent pumping plants for mines in which the water is below the temperature of about 70° or 75° Fahr. When the water is above that temperature it is evident that the exhaust steam from the direct-acting steam pumps cannot be advantageously disposed of, and either the Cornish pump or some other plan, in which the motive power is located at the surface, must be used.

Up to 1878 one of the various modifications of the Cornish pump was exclusively used, both in Europe and in this country. In that year a simple cylinder, non-condensing, single-plunger pump at the Ontario mine, Utah, with 12-inch plungers, 24-inch stroke, and 500 feet vertical lift, was altered into a compound, condensing pump by the addition of an expansion cylinder and a spool-shaped bushing put in the original cylinder, the space between the original bore and the outside of the bushing forming a steam jacket. This pump was, we believe, the first attempt toward a higher grade direct-acting steam pump located in lower workings for permanent mine pumping. It was thoroughly tested, first by the writer and then by the designer of a Cornish pump which had been selected by the writer to be put in should the other not prove economical. It met with strong opposition, mainly from the builders of the Cornish pumps, both in California and the East, and with much skepticism of Eastern mine operators, principally, we think, with the belief that steam could not be conducted in pipes a long distance without a ruinous loss by condensation, and this idea held among many not familiar with the results of the compound, direct-acting, condensing steam pumps that had been put in, until 1884 and 1886, when they were put in a mine at Leadville and in one in Ishpeming, Mich., since which time very few Cornish pumps have been built in this country.

In 1882 or 1883 a Cornish pump was built for the Ontario mine, which is no doubt the best example of that style of pump built, at least in this country. The writer had no opportunity to test it, but the manager of the mine said that he thought it saved a little in steam over the crude, direct-acting, condensing steam pumps that had been installed in that mine. When asked if he was sure as to saving any steam, he replied that he was not, and later advised a mine operator in Leadville to put in the direct-acting, duplex condensing pump as against the Cornish pump, as the difference in cost more than balanced the possible saving in steam.

We know of no publicly reported experiments having been made to determine the amount of condensation in steam pipes until a series was made by the New England Board of Underwriters, and reported in the transactions of the American Society of Mechanical Engineers. The result then had on pipes covered with 1 inch of hair felt, and that by a thickness of burlaps, coincided almost exactly with what we had determined at the Ontario mine with the same thickness of hair felt covered with 10-ounce canvas. At the Wolftone mine at Leadville the condensation in 585 feet of 4-inch wrought iron pipe, covered with $\frac{1}{16}$ inch of asbestos paper, 1 inch of hair felt, and this covered with painted 10-ounce canvas, was 57.75 cubic inches per minute, or 8.396 cubic inches per minute for each hundred square feet of external pipe surface.

Judging by past experience, there is little difference in "duty" between the best examples of Cornish pumps and the best examples of direct-acting, compound condensing pumps, each for, say, 1000 gallons per minute lifted 1000 feet vertically.

With triple-expansion, direct-acting, condensing pumps with the initial steam pressure at the pump at 140 pounds, and the pump running at, say, 125 feet piston speed, the comparison would undoubtedly be much in favor of it over the Cornish pump.

There are, however, other very important considerations to the mine operator as to the relative advantages of the two systems of pumping, besides a little difference in the steam economy. On a basis of 1000 gallons lifted 1000 feet per minute, the installed cost of the direct-acting pump will not reach 10% of that of the Cornish pump. In most cases the working out of the mine beneath the foundations of the Cornish pump engines will, by settlement, throw it out of line, it not being a self-contained machine like the direct-acting pump. So, also, with the "pit work."

Another very important consideration is the expansibility—if we may so call it—of the two systems. When the size of a Cornish pump is to be determined, a large margin for increase of water through greater depth or side workings has to be allowed for, and what this margin is to be is difficult to determine. As a rule, but one Cornish pump can be installed in the one-pump compartment of the shaft, and it cannot be replaced by another without allowing the shaft to be flooded; and it is a question if it could be

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taken out as fast as the water would rise. This would depend upon the amount of ground worked out. Frequently there is allowed a greater margin for increase of water than afterwards proves necessary, either from the ore body giving out or less water being encountered than expected. The interest on investment and wear and tear of a larger machine than necessary are important considerations; or it may be years before the full capacity of the pump is called for. On the other hand, if too small a pump is put in, a new shaft has to be put down in which to install another and larger pump. Thus the size of the pump has to be determined once for all.

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If there are two or more compartments to the shaft, one of which is for pump, piping and ladders, that compartment should be well bratticed from the adjoining hoisting compartment. The heat radiated from even the well-covered steam pipe tends to make that compartment an "uptake" and the hoisting compartment a "downtake," and thus fairly good ventilation is to be had in the pump station or level.

We need hardly say that it is important to keep pipes and their bearers snugly to the sides of the shaft, so that there will be left a clear run for the rising of warm or foul air.

When, through the decomposition of pyrites or other minerals, the water is too hot for the condensation of steam below, then either compressed air may be substituted for steam, electric or rope-driven power pumps, or the Cornish pump must be used. With the utilization of mountain streams as a source of power, and either electricity or compressed air to transmit it, comes a new feature in mine pumping which will be more and more used, as in most of the metal mining locations the cost of fuel is a "burning" question. The transmission of power to the station pump by electricity would present a simple solution of the difficulty were it not that the speed of the pump has to be varied, either because of increase of water by ground opened or by the seasons affecting the surface water. We think this difficulty can be overcome without uselessly expending power.

The above is given as a summary of the relative advantages of the two systems of mine pumping, for a part of which we have to rely upon memory, but we are substantially correct.

Chlorination at Mount Morgan, Queensland.

At the new West Works, which treats 100,000 tons per annum, the low grade gold ores are extracted with a previously prepared solution of chlorine in water, and are not gassed as in ordinary methods. In "Proceedings of the Institute of Civil Engineers," E. W. Nardin describes the plant, which consists of sixteen vats of 100 tons capacity each, four chlorine stills, four towers, four solution tanks, four gold liquor tanks, twelve charcoal filters, three vacuum pumps, three force pumps, and one driving engine. The chlorine is made from salt, manganese dioxide, and sulphuric acid, manufactured at the company's works from imported sulphur. The gas from the stills is dissolved in water trickling over pieces of glass, with which the towers are filled. The solution runs into the storage tanks, which are covered in at the top and worked by pipes and valves in the base operated from above. The vats have a wooden perforated false bottom and layers of gravel and sand of diminishing size are laid upon it. The internal dimensions are 60x1½ feet with a depth between 5 feet at one end and 5½ feet at the other; 1½ feet of the depth is occupied by the prepared gravel bed. The ore is thrown in on this bed and the chlorine solution run in over it. The gold liquor is drawn through and out from below by a small vacuum of five pounds per square inch, and passed on to the storage tanks. Fresh chlorine solution is run in until the exit liquor contains plenty of free chlorine, when the ore is washed through with water. The gold is precipitated by passing the liquor through a 2-foot bed of crushed charcoal lying on a cloth on the wooden perforated false bottoms of the filtering vats, the charcoal being afterwards burnt and the ashes smelted for the metal. The cost worked out during one month at $1.0645 per ton, with ore of the average assay of 11 dwts. 13 grains. The residue contained 22 grains, showing an extraction of 92.06%, the quantity of ore treated being 9852 tons. The cost of the chlorine was 11.85 cents per pound, and the weight used per ton of ore was 2.51 pounds, the time under solution being thirty-three hours, and under water thirty-five hours. The average weight of chlorine per cubic foot of solution was 620 grains, and the still efficiency 72.59%. The richer sulphide ores, containing about four ounces of gold per ton, at the top works are, after roasting, treated by the same process, and show an extraction of 95% with a consumption of 11.47 pounds of chlorine per ton of ore. A new plant to treat 2000 tons of low grade sulphide ore per month is nearing completion.

Cyaniding Rock in Place.

"A little nonsense now and then
Is relished by the wisest men."

We are working a quartz ledge in the Salmon mountains of Siskiyou county, California, and our postoffice is Callahans, 50 miles from the mine. For obvious reasons, it will be understood why I do not locate the claim definitely. "There is me, and the cook, and the Portugee bold," to say nothing of Quo Vadis the mule, Cyrano the dog, and Taddles the cat. The snow is 10 feet deep on the level, and the new century is here. The Portugee is bewailing his fate: "Notra dam turk', notra dam Tom an' Jer', notra dam ting 'cept ham an' bac', an' snow, an' work-work-work!" He is too lazy to showshoe it out, and moreover, as we have but embryo bullion, which he declares to be bogus, and will have none of, what can we do toward paying him off? Neither old Joe nor I believe Manuel desires to leave. We have fired him several times during the past five years, paying him in coin of these U. S., or in I. O. U.'s, as the case might be, and after a howling week of jag at the nearest camp the Portugee, accompanied by R. E. Morse, has found himself again under our vine and fig tree (i. e., tunnel and shake roof), begging for "one dose de good-a bromo."

But I digress. This is the story of a new (?) process in gold mining, not the incidents of a Portugee's periodicals.

The snow is so deep, the wind so painfully mournful through the pines; there is such a lack of congeniality between men shut up in a cabin that I'm garrulous, even on paper.

Two years ago we found the Pizen Dog claim while digging a water hole above a spring. It did not crop, and the foot of quartz between diorite walls panned a good string of flour gold, so fine that it floated when the water was off the prospect for a moment, but it was good to look upon—a hundred-dollar prospect. We covered it, blazed some trees in a circle around the hole, and kept on our weary march northward, for we had the genuine and only Simon Pure map and description of the Lost Cabin claim, dated A. D. 1855, which Manuel's grandfather upon his deathbed had bequeathed to us while in Mexico—"but that's another story"—and the translation gave the most minute details; so we were sure of finding the diggings. Let me state here in parenthesis that the Lost Cabin placer mine, upon the headwaters of the Trinity river, was worked by two Portugees in the early fifties, and they took out all they could stagger under. One died with D. T. in San Francisco, the other was shanghaied. Manuel's grandfather's brother returned to Mexico broken in health, but the priest took his description of the mine and we have the original document.

You will say it was another "lost mine." It was, but we found it!—found it without the slightest trouble, and it paid as high as fifty ounces per day per man. Not to us—no such luck—but to some fortunate miners who stumbled upon it in the sixties and who worked out the little draw.

We had come 2000 miles and were flat broke, so while old Joe opened a set of books for a store, and Manuel dealt monte and hokey-pokey, I ran an arrastra for a farmer. In two months we had a stake to take us back to the Pizen Dog of the Salmon river.

The prospect was as we left it. We built a wickiup and started a tunnel to crosscut, that in 70 feet gave us backs of 50 feet upon the ledge which we followed, saving the ore.

We built a small arrastra, and Quo Vadis the mule worked a week, when the mine and gulch went dry—not enough water to drink, and the river two miles distant.

The vein is peculiar in some respects. The cleavage is horizontal and the quartz lies in ribboned layers with vertical minute open oxidized seams that carry the free gold. The matrix is apparently barren and the seam colors so fine that panning must be done under water; strike east and west; dip vertical; walls close, hard diorite.

Summer was upon us, so we cleaned up the arrastra. The yield was generous, for the ore was hand sorted. Manuel was sent for supplies to Cecilville, and old Joe and I began developing the pay chimney. We had 35 feet of drifts upon the ledge, when one morning old Joe threw down his hammer and danced out of the tunnel shouting, "By the shinbone of my paternal ancestor, I have it—Eureka!"

Men living in the mountains get "off" easily, so I held on to my drill and followed him out, trusting I would not have more than temporary persuasion upon my hands. There he was, hornpiping it, bareheaded, under a sun of 105° F.

Poor old Joe. We have been partners, broke and affluent in several lands for twelve years, but I never saw him other than the staid and taciturn old Heidelberg student of metallurgy. He waved his arms and shouted, "Holy smoke, and we've been trying to amalgamate it! Blockheads! Stoughton Bottles! It's morogonous!"

"You see," he yelled, "2 Au plus 4 KCy plus O plus H_2O equals 2 Au KCy_2 plus 2 KOH, and that's a lovely equation!"

"Come along, old man, that's a good fellow." He was worse than I feared, babbling chemistry synonyms, and if Manuel had been there we could have strapped him down till the first flush of delirium was over.

Again he shouted, "But 2 KAu Cy_2 plus Zn, me bucco Ananias, yields K_2 Zn Cy_4 plus 2 Au—wow! And she's dry as a bone—percolation perfect!" Again he gave a warwhoop and waved his arms.

"Look here," I yelled, shaking him by the arm, "you come along with me and take a good dose of Manuel's bromo, and a sleep, and you'll—"

"What t'ell's matter with you? I've got it, I tell you—got it pat—the Pegleg and the Lost Cabin will be nothing to the case of purging the Pizen Dog. We'll give him the gold cure!" and he ambled again.

I sat in the shade and wiped my forehead. I think I wept a little. I was sick all over, but old Joe noticed my agitation and came to me.

"Just let me think it out," he said. "It's here, back in the gray matter all right, and bound to come in time. Resurgam!"

I lighted my pipe, but I never dropped the 2-foot drill. I sweat cold all over, but his next remarks sent me to my feet. "She is dry, isn't she? And the gold is free in the seams? We have 50 feet of backs, and 35 feet blocked out, say 125 tons at $100, equals $12,500. Now, why not pour on a cyanide solution, catch it in the drift, drain it into a vat, and precipitate it upon zinc shavings? It will work for us while we sleep, and it is worth trying."

We did no further physical work that day, but the strain upon our mental caliber was tense, and the pro and con resulted in my leaving for Cecilville to round up the mule and Manuel. The latter I alternately kicked and ducked into sobriety, for he was "loaded for bear," and the former I saddled and headed for the railroad 75 miles distant.

Old Joe and Manuel dug a trench along the surface of the shoot over the drift, made a set of receiving tanks, a pump, boxes for the zinc, and built a snug log cabin.

In three weeks I returned. The sample sent to the city assayed $198.75 per ton, and by laboratory test 96½% was saved by the cyanide process. The cyanide, zinc, acids, treatises and grub were carefully packed in by Quo Vadis, and I was footsore and weary, but the first remark of old Joe tired me more: "Did you find how much royalty we have to pay to the patentees?" I had not, so we let it go at that and set to work.

With a makeshift plow we dug a small ditch 2½ miles long, and in five weeks had a trickle of water on the claim. We then carried a strong solution into the adit and held our breaths. Nothing percolated. The tunnel was as dry as a bone. We took turns and watched all night, and the drifts were, if anything, drier than ever. More solution, more examining, more wondering. We kept a steady flow into the adit, which absorbed it readily enough, and upon the third day the roof became wet in patches, then the drip came. We carried it in a trough to the mouth of the tunnel and into the zinc boxes. The trick was done, and the brown residue, slimy and uninteresting, was dried and carefully saved. Manuel was more excited than either of us, and his disgust upon seeing what we called gold was painful.

We worked for a month and then came on heavy rains, and cold weather followed fast. We made an upraise of 10 feet into the ledge, and apparently there is as much gold as before, in the seams, not acted upon by the solution, though the weight of our residue assures us that we have a generous return for our summer's work, and old Joe suggests renaming the mine the Widow's Cruet. Next spring we will attempt a totally new scheme for working the ledge and for saving values, and our dead work will be complete by the time the snow is off.

A CALIFORNIA MINER.

Callahans, Siskiyou Co., Cal., Jan. 15, 1901.

WOVEN WIRE GAUZE AND CLOTH is now made with meshes so infinitesimal as to number 40,000 of the latter to a single square inch. The more delicate classes of wire—those which stand related to scientific instruments—are of such fineness as to render their measurement a matter of difficulty; this task, however, has been made practicable, and platinum wire has been drawn $\frac{1}{7000}$ of an inch and to even greater fineness. Aluminum wire, too, has been drawn as fine as 10,500 yards to the ounce, a size too fine to be measured practically by any gauge or instrument. Iron has also been so attenuated that over 2½ miles in length weighed only one ounce; a more remarkable instance of this class of mechanical manipulation is the drawing of twenty-four grains of gold on a silver wire to 120 miles.

The Mines of Esmeralda County, Nevada.*

Written for the MINING AND SCIENTIFIC PRESS by H. W. TURNER, U. S. Geological Survey.

In the county of Esmeralda, Nevada, ore deposits are known at a great number of points which, in a region better supplied with water, fuel and cheap transportation, would now be worked. It is only the high grade of ores that are reduced; nevertheless, with the improvements in methods of reduction and the gradual cheapening of mine supplies, it is not improbable that lower grade deposits can be handled at a profit on a large scale in the future. The northern part of Esmeralda county is traversed by the Carson & Colorado Railroad and is thus accessible.

As evidence that this section is entitled to some attention from the mining public, the following table of the production of the mines of the county is introduced:

Yield of Esmeralda county, Nevada, from 1880 to 1898, by Chas. G. Yale, from reports of Director of U. S. Mint:

Year—	Gold.	Silver.†	Total.
1880	$953	$1,282,800	$1,231,753
1881	35,000	1,620,000	1,655,000
1882	50,000	1,470,000	1,520,000
1883	60,000	890,000	950,000
1884	75,000	500,000	575,000
1885	150,000	853,000	1,003,000
1886	103,300	619,400	722,700
1887	100,000	562,500	662,500
1888	192,933	555,289	748,222
1889	152,000	398,000	550,000
1890	110,000	350,000	460,000
1891	164,000	371,000	535,000
1892	60,000	80,000	140,000
1893	50,000	20,000	70,000
1894	82,000	3,000	85,000
1895	177,174	5,948	183,122
1896	280,054	13,000	300,054
1897	142,588	4,280	146,868
1898	108,099	3,040	111,139
Total			$11,649,358

† Silver is given in coining value.

There are no complete records of the production previous to 1880, but in the reports of the United States Commissioner of Mines and Mining there is a partial statement for the years 1870 to 1873 and 1876, giving a total of $1,743,268 for those years.

According to S. A. Knapp, a mining engineer, long resident in the county, the total production of Aurora is said to be about $16,000,000 and that of Candelaria $15,000,000, most of which was produced previous to 1880. It is thus evident that the total production, if these figures have any value, is far in excess of the recorded amount, which is as follows:

1870—1873 and 1876	$1,743,268
1880—1898, inclusive	11,649,358
Total	$13,392,626

Moreover, the reported production of the Silver Peak, Palmetto, Pine Grove and other mines before 1880 amounts to several millions. It is not improbable, therefore, that the total production of the county is over $40,000,000.

GOLD AND SILVER.—Up to the present time the main metal product has been almost entirely the precious metals. Perhaps the most notable camp in the county is Aurora, where there are strong ledges which were worked in early days only to a limited depth. The excess of water is said to have prevented deep mining at a profit, but there appears to be a field for the application of modern methods. As before stated, the reported production of Aurora is about $16,000,000.

Next in importance is Candelaria, the production of which is mostly silver, estimated at about $15,000,000. According to the census of 1880, the ore contained horn silver, malachite, galena, tetrahedrite and other minerals. The mine is located on the steep north slope of a ridge, which is capped with basalt. The strongest quartz lode is known as the Holmes vein, which dips northeast at an angle of about 45°. The hanging wall is serpentine and the foot wall siliceous slate and quartzite. There is said to be good ore still in the Candelaria mines, but they are not now being worked. Near Candelaria, Wm. Grozenger is exploiting a silver vein, and there are also other properties in this neighborhood.

The mines in the vicinity of Silver Peak lie chiefly in an east spur of the Silver Peak Range, known as Mineral Ridge. This ridge is composed of a complex of granite, gneiss and schist, on which lies a Lower Cambrian series of rocks composed of dolomite, limestone and green Olenellus slate. The quartz veins lie in this complex, usually within a few feet of the overlying dolomite. The veins dip with the schistosity of the complex usually at an angle of less than 45°, 20° to 25° being common dip. At many points there are dioritic dikes along the veins, and these, at some points, cut the veins, indicating their later age. Practically none of the mines of Mineral Ridge have been worked in depth. There is every evidence that some of the veins extend down far below the present workings. On account of the expense of wood and water, the ores below $10 per ton can not be profitably worked except on a large scale. Water can be piped from the Inyo mountains, and plenty of salt water suitable for milling can be obtained from wells in the Clayton valley. If the coal seams, at the north end of the Silver Peak Range, hereafter noted, prove to be as extensive as seems probable, plenty of cheap fuel will be available.

The famous and much sampled mines of the Silver Peak Mining Company are chiefly free-milling gold ores, and the quartz veins are large, one of them being opened up by surface cuts and inclines for nearly a mile. The concentrates, consisting of pyrite and galena, are valuable. The total product of the mines of the Silver Peak Mining Company is in excess of $1,000,000, but the exact figures are not at hand.

The Mary mine, belonging to John Chiatovich, has been producing for a number of years. Only ore averaging over $10 per ton is taken out. This is milled at Silver Peak, the tailings being treated by the cyanide process.

The Homestake mine—now called Elizabeth—has also been productive.

The Great Gulch, owned by G. W. Leidy, lies about midway between the main mines of the Silver Peak Mining Company and the village of Silver Peak. This vein is said to show an average value of about $20 per ton. At one point it contains a considerable body of arsenopyrite, which carries values.

In addition, there are many claims on the top of Mineral Ridge showing strong veins of quartz, among which may be mentioned the Eagle, Missouri, Crescent and some claims owned by the Valcalda brothers.

Another mineralized district is at the north base of the Palmetto mountains, which lie just south of Clayton valley, in which Silver Peak village is situated. There are here a number of low-grade quartz veins and one silver-lead lode—the Mammoth—the concentrated galena of which shows a value of about $40 per ton. As there are numerous springs and an abundance of firewood, mining could here be carried on cheaply. On the south side of the Palmetto mountains, at Palmetto and Lida valley, veins have also been worked, but these properties were not visited. There are also silver-lead deposits at Sylvania, and Louis Chiatovich is working at a profit a vein near Gold mountain, in the extreme south end of the county.

The Montezuma district, lying east of Clayton valley, is said to have produced lead-silver ore to the value of $200,000. Northeast of Montezuma is South Klondyke. This camp can be reached from Silver Peak in a day's drive. This recent discovery is due to J. G. Court, one of the present owners. The quartz vein is a strong one, striking northeasterly and dipping to the southeast at an angle of about 40°. The ore is chiefly chloride and sulphide of silver and galena, and occurs in pockets and small ore chutes, the largest one thus far developed being perhaps 40 feet long. About sixty tons of high-grade ore have thus far been shipped to the smelter. This had a gross value of over $280 per ton. The South Klondyke quartz vein lies in slates, which are intruded by a dike of muscovite-granite. This dike follows the course of the vein and lies a few feet below in the foot wall country rock. Doubtless, the vein owes its origin to this intrusion. The slates are also intruded by white rhyolite dikes, but these probably are of later age than the vein. A short distance south of Klondyke is a quartz vein containing gold and silver, and in the gulch below this vein about $2000 in coarse gold was recently washed out of the loose material by Mr. Turner of Silver Peak. There are also other quartz veins now being prospected in the vicinity. The South Klondyke Camp is supplied with good ore from a well 150 feet deep in the valley to the southwest.

Lying about 10 miles nearly due north of South Klondyke is the new camp called Tonopah, at an elevation of over 6000 feet. This may be reached from Silver Peak or from Sodaville on the Carson & Colorado Railroad. The latter route possesses the advantage of having water at two points—Summit Springs and Crow Springs. The distance from Sodaville to Tonopah is, approximately, 60 miles. The veins at Tonopah were discovered in 1900. There are several of these veins from 1 to 10 feet in depth, with an approximately east and west course and with a vertical dip so far as developed. The ore contains more silver than gold and varies a good deal in value, but considerable portions of the vein average upwards of $60 in value, with occasional chutes of very high-grade ore. The country rock is white porphyry (rhyolite). Water is obtained from Tonopah Spring, about 3 miles distant. There is no wood in the neighborhood. Fig. 1 gives an idea of the nature of the region about the camp. The cost of mining, sorting, transporting and reducing the ore is said to approximate $50 per ton at the present time.

A silver-lead deposit is being worked in the Monte Cristo mountains, northeast of the Columbus Marsh, by Gilbert & Thompson.

The Indian Queen mine, at the north end of the White mountains, near the California line, has altogether produced a considerable amount of the precious metals. This property was not visited.

In the Silver Star mining district, about Sodaville, ore deposits have been found at many points. The most notable camp is Douglass, about 8 miles by the road west of Sodaville. According to W. J. Douglass, the gold veins were discovered in 1894, since which over $300,000 have been produced. The ore milled averages $25 per ton. Mr. Douglass states that the veins have an east-west trend and dip to the south.

North and northeast of Luning, in the Gillis Range, and elsewhere, veins were formerly worked. In the Hawthorne district, in the range southeast of Hawthorne, are the Pamlico, La Panta and other mines. The La Panta was visited by H. R. Johnson, who reports that the ore occurs in chambers usually at the contact of an intruded sheet of quartz-porphyry with the enclosing limestone. The chambers are irregular and from a few inches to 10 feet in diameter. There are dark dioritic dikes cutting limestone or dolomite near the mines. S. A. Knapp gives the production of La Panta mine as $260,000 and the Pamlico as $150,000. The Big Indian mine, in the Wassuck Range, southeast of Hawthorne, is said to have produced $100,000, chiefly gold. In the northern part of Esmeralda county, at Pine Grove and elsewhere, there are mines which were worked many years ago. Some of these properties are still producing. The total product at Pine Grove has been several millions.

COPPER.—There are deposits of copper at many points in the county, but very little has thus far been produced. Copper is found in the range northwest of Sodaville, one of the mines being owned by Robert Stewart, who recently shipped fifteen tons of ore containing 27% copper and ten ounces silver to the ton. According to the report of the Director of the Mint for 1883, there was reduced from the ore of the Blue Light copper mine, in the Silver Star district, 128 tons ingot copper, the ore averaging 25%.

The Vulcan Mining & Smelting Co. has been vigorously exploiting a copper lode about 5 miles east of Luning. An account of this property may be found in the MINING AND SCIENTIFIC PRESS of Oct. 6, 1900, written by E. McCormick. The ore now obtained is chiefly carbonate, with some sulphide. It occurs in dolomite along the contact of an intrusion of quartz-diorite-porphyry.

The Pacific copper mine lies on the north slope of the Pilot mountains, east of Sodaville, at an altitude of about 8000 feet, and the lode is a bed of dark chert 600 feet or more in width and of much greater longitudinal extent. This chert bed has been thoroughly shattered and broken up along a dike of a light colored dioritic rock. The copper-bearing solutions have penetrated the shattered portions of the chert bed and deposited the ore, which is chiefly cuprite or red oxide of copper. The weathered outcrops of the chert layers are of a dark rusty color and show, as a rule, no traces of copper oxide or carbonate on the weathered surfaces. It is only when the rock is broken that its valuable nature is made apparent. This ore is said to average several per cent of copper, part of it being high grade. S. A. Knapp, one of the owners, is confident this brecciated chert ore can be concentrated. Fig. 2 gives an idea of the size of the croppings. In one of the tunnels a considerable amount of native copper occurs, and the water running from this tunnel deposits a rusty iron precipitate. It is used for domestic purposes. The water issuing from another tunnel close by forms a green copper precipitate as it runs down the gulch. There is an abundance of wood in the neighborhood and strong springs. As there are upwards of 400,000 tons of this ore in sight, the mine undoubtedly has a commercial value.

An undeveloped copper lode, showing near the surface carbonate and sulphide of copper, lies in Section 31, Township 4 N., Range 31 E., near Huntoon valley, in the western part of the county. This is the property of J. G. Booker of Hawthorne.

COAL.—At the north base of the Silver Peak Range there are Miocene sandstones and shales which contain coal seams in places 10 feet thick. An account of this coal field was published in the MINING AND SCIENTIFIC PRESS, Vol. 77, 1898, p. 488, by M. A. Knapp. The beds containing the coal are lake deposits. Joseph Sigel of Chicago is now engaged in boring in the lake beds to the northeast of the known croppings of the coal seams, to determine the quantity of coal. The results of Mr. Sigel's exploitation may be looked forward to with interest. The coal seams undoubtedly underlie several sections in this vicinity.

BORAX.—For many years borax has been obtained from several of the salt marshes of Esmeralda county. The total production has been large. It has come chiefly from Rhodes' Marsh, Teal's Marsh and the marshes of Columbus and Fish Lake valleys. The work of collecting the borax salts is done chiefly by Chinese and Indians. At present the industry is being carried on at Rhodes' Marsh, Columbus and Fish Lake marshes. The marsh in Clayton valley, east of Silver Peak, shown in Fig. 3, is partly covered with a dazzling white efflorescence of chloride of sodium, or table salt. It is sufficiently pure to be used for domestic purposes.

ARTESIAN WATER.—No artesian wells have, so far as I know, ever been bored in Esmeralda county, with the sole exception of one in Fish Lake valley on the ranch of John Chiatovich. This boring is said to be 500 feet deep, the bottom of the bore being in clay. The water-bearing stratum was not penetrated, but if the well is sunk below the clay, water may be ex-

*See engravings front page.

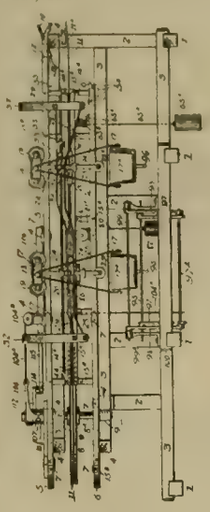
pected. Undoubtedly, artesian water can be obtained in many of the valleys if the wells are properly located, and the determination of the areas where artesian water can be obtained would be a matter of great importance to the county; however, water comparatively near the surface certainly exists in most of the valleys.

Mining and Metallurgical Patents.

Patents Issued January 22, 1901.

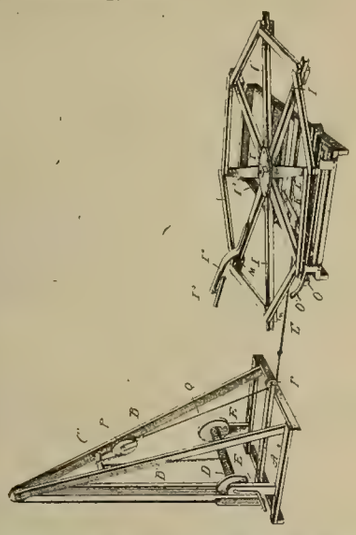
Written for the MINING AND SCIENTIFIC PRESS.

TRAMWAY TERMINAL.—No. 666,267; C. T. Finlayson, Denver, Colo., assignor to the A. Leschen & Sons Rope Co., St. Louis, Mo.



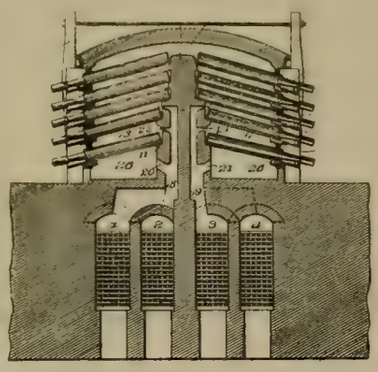
In wire rope tramway terminals having bucket and clip releasing station, loading dumping station, combination with traction rope, clips, buckets, of guideway for rope and clip, slideway on guideway, slide mounted on slideway at clip releasing station, provided with levers arranged to operatively grasp incoming bucket, means including incline planes for releasing levers at loading or dumping station, second slide mounted on slideway, also at clip releasing station, provided with dogs arranged to grasp clip, means for releasing clip slide at end of guideway, lever pivoted to clip slide at end, pivoted at opposite end to end of second lever having its opposite end pivoted to bearing attached to terminal frame; third lever pivoted at end to bucket grasping slide, having opposite end curved, curved slot in curved end, lateral extension on second-named lever toward the first-named lever, pin loosely extending through curved slot of third end of third lever, secured to end of extension of second lever, fourth lever pivotally attached at end to third lever just above its curved end, pivotally attached to second lever opposite extension, means including weight for returning levers and slides to clip releasing stations whereby clip and clip-slide as they move through and along guideway carry the first named lever with them, this first lever moves second, third and fourth levers to impart a positive but slower and retarding movement to said bucket slide and the buckets from clip releasing station to loading or dumping station.

WELL DRILLING MACHINE. — No. 666,478; J. J. Koger, Mooresburg, Tenn.



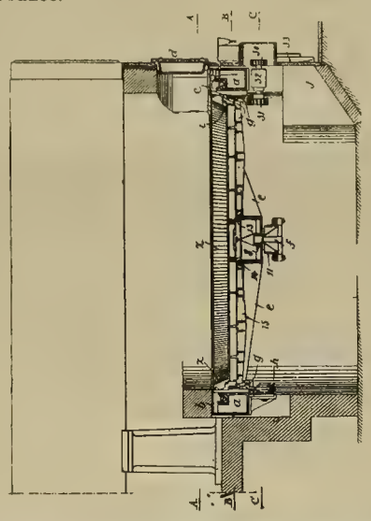
Combination with drill, upright having pulley blocks, windlass and rope connections between windlass, pulley blocks and drill, horizontally rotatable wheel having radiating spokes, blocks mounted on under surface of spokes adjacent to outer ends, horizontally disposed guard piece having upturned end, underneath which guard projecting ends of spokes are adapted to pass, bar pivoted at one end to frame of machine, connections between bar and drill-actuating connections, anti-friction roller at free end of pivoted bar, in path of blocks, adapted to be struck thereby, as each block contacts with roller, whereby drill is raised.

REGENERATIVE RETORT HEATING FURNACE.—No. 666,390; C. F. Neureuther, Peru, Ill.



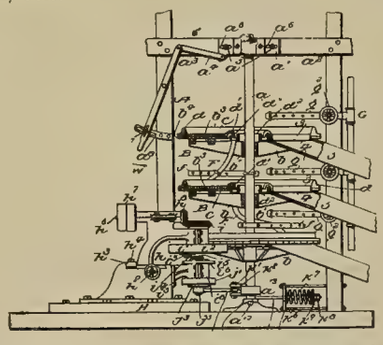
A retort heating regenerative furnace having combustion chamber, vertical wall extending upwardly dividing it into two compartments serving with outer walls to support tiers of retorts, regenerators communicating with compartments of combustion chamber, each having port entering base of compartment on one side of division wall extending upwardly within such division wall, opening at different heights into compartments.

ROTARY FURNACE.—No. 666,517; C. Groll, Roubaix, France.



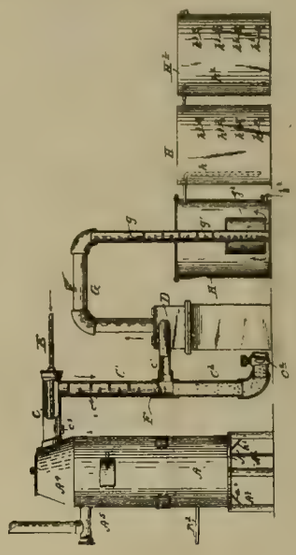
Stationary annular casing forming air chamber, having air inlet provided with open top, air outlet upon inner periphery at top, stationary cover extending over top of casing, projecting inwardly beyond, cover consisting of substantially horizontal lower section, refractory upper section, rotary grate having portion projected into proximity of lower section of cover adjacent to air outlet of casing, air outlet so located as to discharge air directly against meeting edges of grate and cover.

ORE CONCENTRATOR.—No. 666,603; H. H. Cramer, Aspen, Colo.



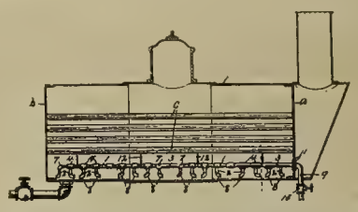
Ore concentrator comprising series of tables arranged one above the other, each having segmental opening, circular passageway extending nearly entirely around, with transverse opening between ends over segmental opening, inner and outer ribs concentric with passageway, series of circular troughs for tailings concentric with and partly surrounded by inner ribs, means for conveying tailings from each trough to and on passageway of next lower table, means for tilting several tables and reciprocally rotating all tables in unison.

APPARATUS FOR TREATING ZINC ORES.—No. 666,597; S. G. Bridges, Kansas City, Mo.



Furnace, retort therein, chamber above furnace into which upper end of retort opens, pump on lower level than chamber, pipe leading from chamber having lateral branch connecting it with pump, baffle plates in pipe, water spray in upper part of pipe, trap at lower end of pipe, deflector F over lateral branch to cause any solid matter to fall into trap, closed condensing tank connected with outlet side of pump, settling tank receiving overflow from condensing tank.

BOILER CLEANING DEVICE.—No. 666,408; W. Chesterman, Punxsutawney, Pa.



Boiler cleaner comprising head composed of series of tubular T-sections connected end to end with each other, branch conduits connected to sections alternating with each other on opposite sides of head, branch conduits having their free extremities arranged substantially parallel with head.

THICKENING OR SOLIDIFYING MINERAL OILS.—No. 666,010; H. Helbing and F. W. Passmore, London, England.

Method or process of thickening or solidifying a petroleum oil which consists in treating same with sodium salt of casein in aqueous solution and then hardening by means of formic aldehyde.

PROCESS OF MAKING ZINC SULPHIDE.—No. 666,300; E. Beringer, Charlottenburg, Germany.

A process for formation of sulphide of zinc suitable for manufacture of white paints and for simultaneous formation of rhodantes or sulpho-cyanides, comprising treatment under pressure and at temperature not exceeding 300° F. of carbon bisulphide by ammoniacal solution of zinc oxide, mixture being agitated until reaction is completed.

WASTE gases from the iron ore calcining kilns at Kotterback, in Upper Hungary, owing to the presence of sulphurous acid and mercury vapors, injure the vegetation in the vicinity. In order to obviate this and at the same time to recover the mercury as a by-product, and so reduce the cost of calcination, the waste gases are collected and purified. The kilns are divided into three groups. The gases of each group are conducted through a wooden tower, in which two grates are placed. These are covered with limestone, on which water plays. The gases traverse the tower in the opposite direction to the falling water, and are thus cooled and condensed, the sulphurous anhydride being dissolved and acting on the limestone. The condensed mercury is collected.

IN Swedish mines the workmen have their tools sharpened by a special blacksmith, paid not by the number of tools sharpened, but by the number of yards bored by the miners whose implements he has sharpened during the month.

MINING SUMMARY.

Specially compiled and reported for the MINING AND SCIENTIFIC PRESS.

ALASKA.

At Juneau a new tram is going in on the Lucky Chance; Supt. E. O. Smith.

The Chesna M. Co., operating the Chesna group, consisting of thirty-three creek and bench claims in the Chestochena fields, on Copper river, will work them this season.

ARIZONA.

COCHISE COUNTY.

The Grand Central and Contention mines, near Tombstone, are bonded; large pumps will be put in and work begun.

The main shaft on the Copper Crown, near Dragoon, is down 100 feet.

GILA COUNTY.

The Geneva, near Globe, is shipping ore to the smelter at that point; ore is said to average 22% copper.——Work is in progress on the Golden Wonder, south of Oak Springs.——Johnson Bros. & Rane are working property on Mineral creek, 1½ miles southeast of Ray.

E. H. Cook, Supt. United Globe M. Co., at Globe, has resigned; N. S. Berray will succeed him.——The Lost Gulch Copper Co., Manager J. Langley, is pushing work on its property adjoining the Black Warrior.——The Bobby Burns is leased to F. Golding.——Machinery for the Black Copper mines will soon be in, when work will be begun.

The Tonto Basin M. Co. will operate an arrastra on the Single Standard, near Tonto. The ledge on the property runs from 18 inches to 3 feet in width. The ore averages $26 to the ton.

GRAHAM COUNTY.

Work on the new 500-ton concentrator for the Arizona Copper Co. at Longfellow is progressing.

A strike of rich ore is reported on the Comstock, in Bonanza gulch, 5 miles from Morenci.

MARICOPA COUNTY.

At Phœnix the following companies are incorporated: Majestic Oil Co., capital $300,000; Merwin M. Co., capital $100,000; Goodwin Kern County Oil Co., capital $500,000.

The People's Oil & Mineral Co., capital $500,000, and the International Oil & Dev. Co., capital $500,000, are incorporated at Phœnix.

MOHAVE COUNTY.

At Cerbat work on the Alexander, formerly the Rough Ashler, goes on.——Work on the Delafontain at Stockton Hill will begin soon.——A shipment of ore from the C. O. D., near Kingman, was made to San Francisco recently for a test. Should returns prove satisfactory a mill will probably go in.——The Denver M. Co., who have an option on the Samoan, will begin work on the same.——Three shifts are sinking the shaft on the Redemption.

The Redemption, near Chloride, is reported sold to W. D. O'Niel of Pittsburg, Pa., for $5000.

The mines of the New England & Arizona M. Co. are being put in shape for a continuous run; mill will start up next month.

The Copper Belle at Turquoise is putting up a 60-ton smelter, to be blown in next month.—— W. F. Grounds has opened up good ore in his Music mountain mine, near Kingman.——The Mollie Gibson, near Chloride, is shipping ore.——The cyanide plant of the Arizona & New England M. Co. at Pyramid is running.——A mill will go in on the property near the Gold Road, Kingman, recently located by Mrs. L. Shipp and Hart Bros.——The concentrator is in place at the C. O. D.—— A mill may go in on the Mocking Bird, near Kingman, operated by Potts & De Nure.

The Sheeptrail mines, near Kingman, are turning out ore for a run in the mill.

YAVAPAI COUNTY.

The Lincoln group, near Jerome Junction, is sold to C. J. George and E. C. Chapman. A 90-foot tunnel is run on the Quien Sabe and a 60-foot shaft sunk on the same. On the Yellow Jacket a 4-foot ledge is opened up in the tunnel. More stamps will be put in.

In Humbug district the Farley-Kay properties will be worked by a St. Joe, Mo., company. Two tunnels are to be driven; one, 3400 feet long, to tap the ledge at a depth of 900 feet; the other, 1400 feet long, to tap the ledge at a depth of 600 feet.

A group of claims in the Big Bug district near Prescott is reported sold to T. B. Comstock, representing an English company.

Ore from the Queen Bess, near Prescott, is said to run $80 to the ton.——A compressor and drills are going in on the McCabe at Chaparral.

CALIFORNIA.

ALAMEDA COUNTY.

The salt works extend along the shore of San Francisco bay a distance of 15 miles, and from the bay inland from 1 to 4 miles. The waters of the bay contain about 3% salt. The recovery is accomplished by retaining the water deposited at high tide by means of large vats formed by levees. In the progress of evaporation the water is allowed to run from one vat to another until, from the concentration of the liquid, it is solidified to crystallization strength—about 25%—before being turned into the making vats. The evaporation is wholly solar. The coarse salt is sacked for shipment at the vats. The table salt is produced by process of drying and grinding. The quantity of table salt is dependent principally upon the skillfulness of the operator and the character of the mill. The eight firms of makers and refiners of salt employ at the salt beds 300 men during the season, the mills or refineries aggregating about 150 during the year.

AMADOR COUNTY.

Work on the Pleming, near Jackson, bonded to the Con. Jackson M. Co., will begin shortly.——On the Kirkwood the shaft is down 230 feet. Crosscutting will be done at a depth of 500 feet.——The Peerless shaft, now down over 600 feet, will be sunk to the 1000-foot level.——Work on the Bay State mines, near Plymouth, will soon be started.——The Ivanhoe mill at Plymouth is running on ore from the Shenandoah. Supt. Thornton reports finding a good body of ribbon rock on the 500-foot level at a point 850 feet in from the shaft.——The Bellwether, near Jackson, has reverted to Mrs. Hepburn by default of the Hepburn M. Co. She, with J. A. Morlan of Los Angeles, will operate the property.

The East Central Eureka M. Co., of Sutter Creek, has brought suit against the Central Eureka M. Co., same place, in the Superior Court, at San Francisco, for $165,000.

BUTTE COUNTY.

At the Cherokee placer mine, at Cherokee, two hydraulic giants are working steadily; thirty men are employed.

CALAVERAS COUNTY.

The stamps and mill from the Thorn will go in on the Densmore, near Parrots Ferry. A cyanide plant will also go in.——An arrastra will go in on the Virginia at Grapevine gulch.——W. D. Riley is working the Golden Nest, on the San Antone and Indian creek ridge.——Wyllie, Potter & Treat Jr. have begun work on the old Grounder hydraulic claim, on Murray creek, near San Andreas. It is estimated that 1000 carloads of boulders will be removed from the ground.——At Angels a good-sized body of ore is opened up on the 500-foot level of the Angels.——The new chlorination plant at the Lightner is running satisfactorily. Work is in progress on the Gold Cliff of the Utica group.——Good ore is opened up on the 600-foot level of the Demarest.——A good clean-up is reported from the Ozark gravel mine, near Murphys.

Work is begun on the Sunrise, at Railroad Flat; J. L. Lester foreman; mine is unwatered and sinking is in progress; three eight-hour shifts will be put on.

The electric system and machinery for operating the Sheep Ranch mine by electricity are completed.

The Oriole M. Co., Angels, has levied an assessment of 10 cents per share, to run a 300-foot tunnel into the shaft to clear it of water without the use of a pump.——Crosscutting is under way at the Manhattan, Angels, and another shift is put on.——Oil is to be used as fuel at the Crystalline.

EL DORADO COUNTY.

Twenty-five men are working on the Shaw, near Placerville. A 5-stamp mill is going in. A new hoisting plant is up.

The Ralston G. M. Co. has a permit to mine with hydraulic pressure at Lynchburg.

H. C. Ewing, while piping on his mining claim at Pilot Hill, recently found a nugget worth $2000.

Ore assaying $50 to the ton is opened up on the Burnham, near Georgetown; ledge is 8 feet wide at a depth of 100 feet.

GLENN COUNTY.

Two new companies, the Grapevine Coal & Oil Co. and the St. John Dev. Co., are incorporated at Willow.——The Glenn County Oil & Coal Co.'s well, near Willow, is down 273 feet.——The well of the Great Northern Oil Co., same district, is down 400 feet.

INYO COUNTY.

The Defiance mine at Darwin, owned by the Pat Reddy estate, has been bonded to S. B. Milner and C. D. Rooklidge of Salt Lake City for $100,000.

KERN COUNTY.

The Shasta Oil Co. is putting up a derrick on its No. 3 well on 14, 28-27 at Bakersfield.——The Gray Gander Oil Co. is drilling on 7, 28-28.——The Chicago Crude Oil Co., operating in the northwest corner of 30, 28-28, has put up three new rigs, and it has three strings of tools operating.——The Standard Oil Co. has completed two large iron tanks and is putting up three more.——Well No. 13 of the Continental Oil Co. at Bakersfield was completed in thirty days.

At the Exposed Treasure, near Mojave, the new plant, capacity fifty tons per day, is nearly completed. The shaft is down 460 feet. The ore runs $67 to the ton.——On the Karma the shaft is down 280 feet. Four hundred feet of drifting is completed.——Work is in progress on the Mojave group, adjoining the Karma.——Ore running $180 per ton is opened on the Little Johnnie, an extension of the Mojave group.——It is estimated that the output of the Mojave mines from March 1, 1901, to March 1, 1902, will be more than $300,000.

At Midway the Transfer Oil Co. is down 300 feet.——New rigs are going up on the property of the Senator Oil Co., Bakersfield.——The Bay City recently struck oil sand at a depth of 570 feet; drilling is going on to the second sand.——The Transcontinental Oil Co,, capital $300,000, is incorporated at Bakersfield.——A project is reported for building a railroad from Bakersfield to Port Harford.——Ludwig & Hickie will begin drilling on Section 17, near Bakersfield.——The well of the Bear Flag, on 31, 28-28, Bakersfield, is down 105 feet, and it is expected to produce 300 barrels of oil per day.——The Linda Vista is down 600 feet.

Operations are resumed on the Little Butte at Randsburg.

The Jenny Lind and Philadelphia quartz mines, at Randsburg, are leased to C. E. Ferris.

LOS ANGELES COUNTY.

The Domestic Oil Co., capital $50,000, is incorporated at Pasadena.——At Los Angeles the following companies are incorporated: Russian Oil Co., capital $500,000; Brubaker Oil Co., capital $450,000.

The B. B. Oil Co., operating on the Brown tract, near Los Angeles, is down 750 feet; it is expected that oil sand will be struck at 1000 feet.——Pitcher & Garbutt are down 750 feet, with 9⅝-inch hole on their property east of the Pelissier well.——The well of Riley Bros., on Western avenue, Los Angeles, is down 1000 feet.——The Westlake Oil Co. has completed well No. 46, and 47 and 48 are now being pumped; drilling is in progress on Nos. 49 and 50, and a rig is in on No. 51.——The Oceanic Oill Co. will put down six more wells.——The Atlas Crude Oil Co. will drill four wells on its property.——At Sunset Park, the Sunset Park Oil Co. will begin drilling for oil soon.——The Alliance Oil Co., drilling a well near south end of the tunnel, in the Newhall field, is down 700 feet.——No. 1 well of the Regal Oil Co., on the corner of First and Belmont avenue, Los Angeles, is down 850 feet; 15 feet of oil are in the hole.

MONO COUNTY.

In the Standard Consolidated mine at Bodie the stopes in the various ledges yield the usual quantity of ore. At the mill, 375 tons of ore was crushed during the week ending Jan. 19; average assay, vanner tailings, $7,39; concentrates produced, 1.14 tons; assay value, $60.57; amalgam produced, 1306 ounces; assay value per ounce, $2.46.

MONTEREY COUNTY.

The San Antonio Oil Co., drilling at San Ardo, is reported to have oil at a depth of 700 feet.

NEVADA COUNTY.

The Yuba, near Maybert, will be reopened by a San Francisco company; Supt. J. L. Bryson.

Unwatering of the Diamond, near Grass Valley, is under way; hoisting machinery is being put in shape for a run after mine is unwatered; G. Murphy, Supt.

Thomson & Balch of San Francisco are preparing to open up properties near Rough and Ready.——Deasy, Morse & Hawkins Bros. have bonded the Niagara, near Newton.

ORANGE COUNTY.

The Capistrano Oil Co., operating near Capistrano, has shut off water in its well with 9⅝-inch casing at 650 feet, and has struck quite a seepage of oil at 690 feet.

PLACER COUNTY.

The new electric plant at Turkey Hill drift gravel mine, near Michigan Bluff, has been started and is running the mill and electric locomotive which hauls the cars of gravel from the mine.

RIVERSIDE COUNTY.

The San Jacinto Oil Co. will drill another well near San Jacinto.

SAN DIEGO COUNTY.

The Santa Ysabel Water Co. is pushing work on its tunnel from Santa Ysabel creek to placer mines in Hatfield canyon; tunnel, now in 300 feet, will be driven an additional 300 feet; a 3-mile ditch will be dug to carry water to the mines.

A number of borax mines were recently located in the McKain district, 30 miles from Julian.

SANTA BARBARA COUNTY.

The Commercial Union Oil Co., operating at Summerland, is down 780 feet.

SHASTA COUNTY.

The Hiatt G. M. Co. has bought the Cleveland gold quartz mine at Quartz hill for $10,000.

SIERRA COUNTY.

The Telegraph, on Fur Cap, near Downieville, is reported sold to J. W. Finney.

The new compressor at the Gold Bluff, at Downieville, is in and runs satisfactorily.

SISKIYOU COUNTY.

Work at the Gold Ball, in Salmon River district, is progressing; usual number of men working.——After a run on ore from the John Joseph, same district, the Fagundas mill is temporarily closed down.——A new tunnel is being driven on the Humback.——Owing to a heavy fall of snow, the Kleaver, in Salmon River district, is closed down; it will soon resume.——High-grade ore is being taken out of the Esmeralda, same district.——Work at the Salmon River gravel mine is going on.

The Siskiyou Hydraulic M. Co., operating on Klamath river, below Happy Camp, has made some good clean-ups.

STANISLAUS COUNTY.

Haslacker & Kahn will bore for oil between Oakdale and Knight's Ferry.

TRINITY COUNTY.

The Sweepstake M. Co. will build a ditch 29 miles long, including an inverted siphon 10,000 feet long, with a capacity of 4000 miner's inches, from Canyon creek to the mines, near Weaver; a bedrock tunnel is being driven; gravel yields 25 cents to the yard.——The 2800-pound wheel on the dredger in Weaver creek, near Weaver, has broken; a new one goes in.

The T. G. P. M. M. S., Ltd., is operating its drift and hydraulic mines at upper Coffee creek.——The Yellow Rose of Texa mines will resume next spring.

At Poker Flat, near Lowden's Ranch, the dredger in charge of Supt. M. Van Meter is running steadily.——A 12-mile ditch and flume is built from the Last Chance to Grass Valley creek.——The La Grange hydraulic mine, near Weaverville, is about ready to resume.——Work is in progress at the Chloride, 3 miles above Dedrick; Supt. Ramdohr.——A tunnel is being run on the Red Rose, adjoining the Yellow Rose.

TULARE COUNTY.

A magnesite roasting plant is to be built at Porterville; it consists of a 15 H. P. engine, 25 H. P. boiler, crusher, elevator, oil tanks, pumps, etc.; cost will be between $5000 and $10,000 and capacity will be twenty tons of raw magnesite per day. In roasting it will lose 40% of its weight. Twenty tons of the raw will turn out twelve tons of roasted magnesite.

The Porterville M. & M. Co., L. Schwabacher (general manager of the Floriston Pulp & Paper Co. of Floriston) manager, will ship this year's output to Floriston and also to the Crown Paper Mills in Oregon. The furnaces are to be built to burn oil or wood; if former fails, wood will be used. The roasted material will be used, after being pulverized to a fine powder, to take out the resinous matter in the wood pulp used in the manufacture of paper. It is expected that output for this year will be 1200 tons roasted material.

TUOLUMNE COUNTY.

Machinery is going in on the Handover, at Carters. Operations on the Little Beauty will resume soon.——On the Hard Times, Cullers Bros. are sinking a winze 200 feet from the mouth of the tunnel.——At the Confidence, stoping is in progress on the 350 and 560-foot levels; mine is now lighted throughout by electricity.

The low-grade ore on the second level of the Santa Ysabel on the hanging wall of the Boulder vein has been located on the fifth level. It is about 15 feet wide; the values are very low.

The Hamilton G. M. Co., capital $100,000, recently incorporated; properties near Groveland.

Three machine drills are in operation at the Santa Ysabel, at Stent; drifting south is in progress on the 400-foot level. Electric drills will go in at the High Point, and more men will be put on.

Drifting and crosscutting are under way at the Republican, Sonora.——A company is being organized to work the Blue Lizard and Laguria mines, near Groveland.—— Operations on the Harvard, on Whisky hill, near Jamestown, are to begin. A 60-stamp mill is on the property.——Ore being taken out at the Goldwin, near Sonora, runs from $70 to

$80 to the ton.——An arrastra is being built on the Ferguson.

YOLO COUNTY.

Work is progressing at the Spenceville, near Wheatland.

YUBA COUNTY.

J. O'Brien has bonded to Hammond, Doolittle & Woolsey 2000 acres of land 9 miles east of Marysville, which they will prospect with a view to installing gold dredgers. The location is considered a continuation of the old Smartsville channel.

A Keystone driller is on the ground at Indian valley, above Camptonville.

COLORADO.

BOULDER COUNTY.

A deal is on for the sale of the Slede, at Gold hill, near Wall Street. If it goes through, new owners will run a crosscut on the 800-foot level. —— The Beuford mill, at Ward, is running steadily on B. & M. ore.——The shaft on the Superior will be sunk to the 1000-foot level.——A track will go in in the tunnel of the Nimbus.——On the Porto Rico, at a depth of 25 feet, a streak of ore 8 inches wide is opened up. ——The Sunny View and Johanna (patented claims), Ophir Nos. 1, 2 and 3, are sold to Duncan & Wise.——The shaft on the San Blas, now down 600 feet, will be sunk to the 1000-foot level.——Work on the Silver Lake, 4 miles southwest of Ward, is progressing favorably, and will be continued through the winter; shaft, now down 215 feet, will be sunk an additional 100 feet.

CHAFFEE COUNTY.

A new plant is going in on the Lone Star, at Hancock; Manager C. A. Smith. ——The smelter at Buena Vista is being enlarged; new blowers and a larger motor are on the ground.

CLEAR CREEK COUNTY.

The Cornucopia Power & Development Co. is organized to work claims near Idaho Springs; a tunnel will be run to cut the Lone Jack at a depth of 1600 feet; machinery and drills will be put in when development allows; A. J. Bean, Supt.——Operations on the Kinda are resumed after a shut-down of several years; Mr. Crawford of Kansas City, Mo., owner.——Work is in progress on the Neptune group, operated by the Osborne M. & M. Co. of Colorado Springs.——The shaft on the Dover, at the mouth of Fall river, now down 200 feet, will be sunk to the 500-foot level.

J. Clayton will put in a new set of pumps on his Russell Gulch property.

CUSTER COUNTY.

A mill to treat low-grade ores will be built near Rosita by J. W. Randall of Fremont, Mich., and W. B. Lacy of Idaho Springs.

The shaft on the Geyser, near Silver Cliff, is in 2670 feet, being the deepest in the State; it is said that the Eastern stockholders will take over the property and develop it.

EL PASO COUNTY.

A strike of rich ore is reported in the tunnel of the Oil Creek M. Co., now being run under Pike's Peak; ore is said to run $400 to the ton.

GILPIN COUNTY.

Another shift is working at the Sherman, on Silver creek, near Apex.——The following companies are incorporated at Black Hawk: Gregory-Buell Con. G. M. Co., capital $5,000,000; Grand Central G. M. Co., capital $1,500,000.——The London, on Academy hill, near Black Hawk, is shipping ore to that point. —— A new hoisting plant is going in at the Pocahontas, on Dory hill, Black Hawk; Denver men will operate this mine.——Scott, Mee & Co. are working the Golden Flint, at the head of Gamble gulch, southeast of Perigo; lessees will start up the Rollins mill.——Drifting is in progress on the 187 and 255-foot levels of the Woodbury M. Co.'s property near Black Hawk.——In the Illinois Central district, near Black Hawk, two shifts are sinking the Scandia shaft; it is now down 625 feet; drifting is under way on the 550-foot level west of the shaft; Manager Weisbeck.

Good milling ore is being taken out from the 240-foot level of the West Wyandotte, near Russell Gulch.——In Leavenworth gulch, near Black Hawk, three 8-hour shifts are sinking the West Calhoun shaft, which is now down 210 feet; Manager Tully.——McLeod & Co., leasing on the Kemp-Calhoun, in Leavenworth gulch, are taking out ore from the 230-foot level.——At Russell Gulch stoping is under way in the 300 and 400-foot levels of the Minnesota.——Two 100 H. P. boilers are going in on the Buell, of the Gregory-Buell Con. M. & M. Co. at Black Hawk. ——The Chicago-Carr M. Co. is putting in new machinery near Black Hawk.——A ½x4x12 high-pressure Jeanesville pump is being put in by the Gower M. Syndicate, Ltd., on the Montgomery, Black Hawk; it will go in on the 500-foot level temporarily, but will probably soon be placed permanently on the 800-foot level; shaft, now down 522 feet, will go an additional 200 or 300 feet.

GUNNISON COUNTY.

The Colorado Smelting & Refining Co., capital $5,000,000, is incorporated in New Jersey, to work 3000 acres mineral land near Pitkin.

Lessees of the Lead King, at Crystal, are saving ore for shipment in the spring, packing charges being too high at present to warrant shipments being made.

HUERFANO COUNTY.

The recent strike of a 19-foot vein of coal near Walsenburg shows 13 feet of solid coal, the remaining 6 feet being a mixture of slate and coal.

LAKE COUNTY.

H. W. Hinckley has taken a new lease on the Humboldt mine, on Iron hill.

The R. A. M. ships 150 to 200 tons per day of silver-lead ore from the workings at 1065 feet depth. This is a part of the Small Hopes group. M. B. Snyder is foreman.

The Bon Air shaft is the mine farthest southwest of the Home group. It is 535 feet deep and is equipped with steam hoisting and pumping facilities. The workings penetrate the lime formation north, northeast, east and southeast from the shaft on the 500 and 535-foot levels, through crosscuts and drifts, with chutes and upraises from one level to the other in numerous places. On the two levels there approximates 3 miles of work, much of it being dead work performed in prospecting for ore, the latter existing in gash veins, kidneys, chimneys and blankets within and surrounded by the dolomite lime. The workings disclose, however, that these bodies of ore lie within the limits of a horizontal zone which ranges from 20 to 40 feet thick. That is, so far as exploitation goes, the ore seams do not extend much above the upper, or 500-foot level, or much below the lower, or 535-foot. Future work, however, may alter this theory. In places the ore stands almost in a vertical seam, then flattens and widens into an immense blanket. Again, there are shoots of ore which take freaks and turns of all kinds. A body of this is found by driving through the lime; it is worked out and found to have no connection with any other similar body or gash. For this reason the work on these two levels could not conform to any system, but is interesting on account of its complications. The ore consists, in the main, of oxidized iron, carrying silver ranging in value from ten ounces to thirty ounces to the ton; here and there are streaks of lead carbonates, and in one place I saw fine specimens of chloride of silver. The shipments herefrom amount to nearly 100 tons per day. On the 535 level a drift is being driven 1200 feet northward to connect with the Star or center shaft of the Home group. About half this distance has been driven.

Leadville, Jan. 27.

The daily output of the Home M. Co., Leadville, is about 500 tons ore, of which 350 tons are from the Penrose, 125 tons from the Bon Air, and 25 from the Star. ——The Mayr M. Co. is organized to work the White Cap.——Sinking on No. 2 shaft of the Resurrection is suspended owing to influx of water recently struck at a depth of 750 feet.——The shaft on the Maple Street is down 320 feet.——The St. Louis tunnel is leased to G. W. Lancaster; men are working.——The Boston Gold-Copper smelter has two furnaces running, and a third is being put in shape to run.

Supt. Kleckner is running an upraise in the Hummer, at Leadville.——Sulphide ore was recently opened up in the Haphazard, in Lake Park; a shipment of ore will be made to the Boston Gold-Copper smelter.——The shaft on the Butcher Boy, on East Bald mountain, near Leadville, now down 250 feet, will be sunk to the 400-foot level; manager, T. Connors. ——The Sedalia is shipping twenty tons of ore per day, running $25 to the ton.

ROUTT COUNTY.

An explosion of natural gas in the well of the Northwestern Oil & Coal Co., operating near Steamboat Springs, set fire to the derrick and surface buildings, completely destroying them; they will be rebuilt and drilling resumed.

SAN JUAN COUNTY.

The Pride of the West, at Silverton, owned by Denison, Smith and others, will have new hoisting and concentrating plants.

SAN MIGUEL COUNTY.

The new 2000 H. P. power plant of the Telluride Power Co., at Telluride, is reaching completion.——The Smuggler-Union mill is being overhauled. Ten new stamps will be added, making a total of sixty stamps, with a crushing capacity of about 400 tons of ore daily. —— The 3000-foot Pennsylvania tunnel is completed; it is connected with the mill by a new Bleichert tramway.——Recent gold retorts from the Tom Boy weighed between 700 and 800 ounces, an average shipment; monthly output runs about $50,000; it is said that present milling capacity will be doubled.

The Palmyra group, in Turkey Creek district, will be opened at a lower level than the present workings by a 1000-foot crosscut tunnel; Manager J. H. Shockley. ——A new main cable is in on the 2-mile tramway of the Liberty Bell.——Operations on the Nellie group, of the North American Exploration Co., Manager Field, will be started up soon.——The Ophir Con. M. Co., capital $3,500,000, is incorporated; a new tramway will go in this spring.

SUMMIT COUNTY.

At Breckenridge the new 7x7-foot tunnel of the new Gold Run M. & M. Co., now in over 200 feet, will be driven 3000 feet. ——Work on the Jessie group is progressing; the 40-stamp mill will daily treat 100 tons of ore; Manager W. L. Wilson. ——A winze will be sunk at the 1200-foot mark in the tunnel of the Jumbo.——Foote and others, operating the Mountain Pride, have lowered water in shaft to a point below where they contemplate working.——Margarophylite, said to be worth from $250 to $1200 per ton, is reported opened up in the Germania by lessees Smith & Boyd.——A cyanide department is added to the 20-stamp mill on the Cashier; plant is lighted by electricity.——Ore from the Carpenter placer patent, on Nigger Hill, is said to run two ounces to the ton.

TELLER COUNTY.

During 1900 the Vindicator, at Cripple Creek, produced 36,809 tons of ore, yielding gross value of $875,445; the company is deepening its main shaft.——The shaft on the Columbia, now down 340 feet, will be sunk to the 400-foot level.——On the Kentucky Belle a level is being run at a depth of 125 feet.——A strike is reported on the Golden Dale.——Griswold & Meyers, operating the Guess, have sunk a winze 175 feet below tunnel level, giving a depth of 500 feet below surface. A 20 H. P. gasoline hoist is in over the winze.——The Waverly G. M. Co. has begun operations on the Pegleg, on Gold Hill; the shaft is down 200 feet. A new shaft-house was recently built and a 25 H. P. boiler and an 8x10-foot hoist are in.——The output of the Legal Tender, of the Golden Cycle Co., is 100 tons per day. A 3-foot vein of sylvanite ore is opened in the bottom level (700 feet); new machinery is in.——The Lillie shaft, now down 1300 feet, will be sunk to the 1500-foot level. About three carloads of good grade ore from the 800-foot level are being shipped weekly. ——The Grace G. M. Co. is moving its shaft-house and machinery from its Raven Hill property to the Extra.——The Leon, survey No. 10,751, is sold to the Leon Con. M. Co. for $10,000.——A new fifteen-drill compressor is going in at the Vindicator. ——C. E. Brady, leasing the Russell block of the Hull City placer, at Victor, recently shipped sixty tons of ore worth $3450.——Three thousand pounds of ore running about 75 cents to the pound were recently shipped by C. Berg and associates from block No. 2 of the Deadwood; ore was taken from the shoot opened up about six weeks ago on the 570-foot level.——On the 300-foot level of the Wacu Weta, on the west side of Bull Hill, operated by the Fraternal Leasing Co., ore of a good grade is opened up.

The Four Brothers, on Beacon hill, is sold to the Agnes Co. for $55,000.——Ore from the Little Diamond, of the Big Four M. Co., recently returned two ounces gold to the ton.

Work on the Diamond R., at Cripple Creek, will begin soon; property comprises seventy acres lands.——Maynard & Co., who have the lease from the 500-foot level up to the 400-foot level and from the 300-foot level up to the surface on the Moon-Anchor are pushing work on same, and are shipping screenings to the sampler running seven ounces gold to the ton.

Symes, Delaney & Sims, leasing block No. 3 of the Deadwood, recently shipped ten tons of ore that ran $83.50 to the ton; ore was from a shoot recently opened up on the 170-foot level.

The Triumph G. M. Co., capital $1,500,000, is incorporated at Cripple Creek, to work the Triumph, on Battle mountain, and other claims on Squaw, Raven and Tenderfoot hills.

Six feet of high-grade smelting ore are reported opened up on 350-foot level of the Zoe, at Cripple Creek.——The property of the Eleanor Co., on Galena hill, is leased to Sheets & Co. of Colorado City; work is in progress; a shaft will be sunk.

IDAHO.

ADA COUNTY.

The Powder River M. Co., capital $250,000, is incorporated at Boise.

BLAINE COUNTY.

The Elk M. & M. Co., of Milwaukee, Wis., has bought the Champlain, Alabama, Hattie and Annie Black claims, on the Hailey Gold Belt, from J. and E. Van Guylder, for $15,000.

The shaft on the Golden Star, at Hailey, is down 400 feet, and drifting is in progress on that level.

IDAHO COUNTY.

The Blue Jacket, between Goff and White Bird, is being worked by Finch & Campbell; fifteen men are employed.——Drifting is in progress on the Samson group, of the Samson Group M. & M. Co.

The Blue Jacket (copper-gold) at Whitebird is running. Fifteen men are employed.

LATAH COUNTY.

Taylor Brothers are working two shifts driving a tunnel on the Mother Lode, near Moscow; work on the road to White Pine is suspended owing to deep snow.——Moore & Armstrong, operating the Linsley property, are pushing work.——E. Mason will put in a pump on his property near Garfield, and will resume sinking. ——J. K. Truax and C. Marsh have completed their flume.——Piping is going in on the Richard Price (placer).——The 1½-mile flume on the Mascot Hydraulic Co.'s claims will be completed this month.——The Bucyrus Dredge Co. is preparing for spring work. —— The Chickisaw M. & Smelt. Co. will sink its shaft, now down 65 feet, to the 135-foot level. An engine, hoist, pump, two large tanks, buckets, etc., are in.——Brunch & Hutchinson, W. G. Conner and others are getting their placer properties in readiness for spring work.

LEMHI COUNTY.

A strike of $750 ore is reported on the Comet, 20 miles north of Salmon City.——On the Katie, ore running $500 to the ton is said to have been opened up recently.

OWYHEE COUNTY.

Irwin, Norton and others have bonded the Trook & Jennings property, on the west side of War Eagle, near Silver City; work will soon begin.

SHOSHONE COUNTY.

The first shipment of copper ore from the Cœur d'Alenes was made some days ago by the Snowstorm M. Co.; ore was taken from the Snowstorm, near Mullan, and was shipped to the Tacoma, Wash., smelter; returns give fifteen ounces silver and 11½% copper; tunnel on the Snowstorm, now in 180 feet, is expected to cut the ore body at the 250-foot mark, giving a depth of 175 feet.

The Bi-Metallic M. Co. has resumed operations on its property, adjoining the Sixteen to One, near Wallace.——The Chloride Queen M. & M. Co. will soon begin operations.——The drift being run by the Stevens Peak M. Co. is in over 800 feet, and a crosscut is being run.

The tunnel on the Leslie group, near Wallace, is in 650 feet, and has secured a depth of 400 feet.——The shaft on the Gold Back (copper), at Murray, is down 46 feet.

MICHIGAN.

GOGEBIC COUNTY.

Over 3000 tons of ore are mined and shipped each day from the Norrie (iron), in the Gogebic range.

MONTANA.

JEFFERSON COUNTY.

The Helper, at Basin, is shipping ore. ——W. B. Lyons & Co. are making regular shipments of ore from the Buckeye, in Cataract district, near Basin.——Taylor Bros. are working the Solar, Cataract district.——Ore is being mined at the St. Lawrence for shipment.——Operations on the Sally Belle, in Red Mountain district, are resumed; property is bonded to the Peck Concentrating Co., of East Helena.

MADISON COUNTY.

The Kearsarge, at Summit, recently shipped five tons of ore for a test.——Thompson & Buzzard are sinking a shaft on the Old Townsend, at Summit.——A strike of good ore is reported at the Chile, near Sand Creek; General Manager Browning; capacity of mill may be increased to twenty stamps; shaft will be sunk another 100 feet.——It is locally reported that F. A. Heinze of Butte will operate the Noble.——Work on the new mill going in on the Lake Shore is suspended for the winter.

A strike of rich ore is made at a depth of 300 feet in the Chile, at Sand Creek, 12 miles from Pony.

SILVER BOW COUNTY.

On the 1st inst. the Anaconda Copper M. Co. inaugurated an eight-hour work day system in all its mines at Butte.

NEVADA.

ELKO COUNTY.

On the Hartman & Fordham property, near Sprucemont, good ore is opened up in the winze at a depth of 60 feet.

EUREKA COUNTY.

Johnson Bros., operating the Silver

Connor, on Prospect mountain, near Eureka, are shipping ore from the 500-foot level.

LINCOLN COUNTY.

A new concentrator and 10-stamp mill goes in on the Abe Lincoln group, near Pioche.

LYON COUNTY.

The Boston-Montana Copper Co. of Butte, Mont., are credited with intention to build a 150-ton smelter at Wabuska. The company has bonded the Bluelight, in Mason valley.——A deal is reported on foot for the sale of the Logan & Hullyey, near Como, to an English company. It is estimated that there are 100,000 tons of $8 ore in sight.

STOREY COUNTY.

Main lateral drift on the 1100-foot level of the Crown Point, at Virginia, is being cleaned out and retimbered.

On the 2050-foot level of the Con. Cal. & Va., at Virginia, the northwesterly drift 100 feet down from top of winze, sunk from the 1950 to the 2150 foot level, is run 86 feet; repairs to main shaft are made. ——The west drift on the 56-foot level of the central tunnel of the Ophir is in 283 feet; face in quartz and porphyry.——The west crosscut on central tunnel level of the Mexican is run 285 feet.——The Hale & Norcross tunnel is in 1991 feet.——At the Sierra Nevada the west drift on the 1600-foot level is cleaned out and repaired for a distance of 920 feet from the shaft.——The main north drift on the surface tunnel level of the Chollar is run 477 feet from the shaft.——The south drift on the 80-foot level of the Greek shaft of the Potosi is out 207 feet; face in quartz, assaying $3 to $5 per ton.——In the Silver Hill the northwest drift is in 169 feet; face in porphyry with seam of quartz, assaying $16.50 in gold per ton. Ore is being taken from the eleventh, twelfth and thirteenth floors of the 425-foot level of the Gould & Curry; 190 tons of this ore sent to the mill returned $10.63 (coin) per ton.——On the 425-foot level of the Best & Belcher the station at the top of raise, 60 feet up from track floor in No. 9 crosscut, is completed. ——On the Utah surface tunnel No. 2 is extended 845 feet; face in hard porphyry.

WASHOE COUNTY.

Wedekind, Johnston & Rice are pushing work on their Zircon claims near Reno.

WHITE PINE COUNTY.

New machinery, including a rotary drier, is going in on the Robust at Ely. Work is progressing satisfactorily.

NEW MEXICO.

COLFAX COUNTY.

More men will be put on at the Lexington, at Raton.

GRANT COUNTY.

The Hanover, at Hanover, is shipping from $12,000 to $15,000 worth of high-grade ore monthly.——Daily output of the Iron Head is from $500 to $1000.——The Santa Rita Co., at Santa Rita, has begun work in its three double-compartment shafts, and will soon be taking out ore.

LINCOLN COUNTY.

On the Lady Godiva, at White Oaks, ore running 17% copper, 400 ounces silver and ninety ounces gold to the ton is reported opened up; Supt. B. H. Dye.

OREGON.

BAKER COUNTY.

The Columbia M. Co. has put in a new pumping plant on the Columbia, on Snake river, near Baker City. The plant is said to be the largest of the kind in eastern Oregon. The shaft is down 620 feet. The monthly output runs about $30,000.——A deal is said to be on for the sale of the Brazos. A 10-stamp mill was recently put in on the property. Work is in progress on the 385-foot level.——On the Golconda the sand pipe is down 400 feet. The water pressure in the same is 3500 pounds.——The 20-stamp mill on the Bald Mountain is running.——In the California from 7 to 8 feet per day per drill is said to be made.

F. B. Thomes, of Butte, Mont., is said to have bought all the mining property of the Gold Ridge M. Co., near Sumpter, for $100,000.

At the Carroll, near Baker City, an ore chute 12 inches wide was recently struck at a depth of 80 feet.

The Tillamook G. M. Co. is incorporated at Sumpter, to work the Tillamook group, near there.

The new crosscut on the California, in Cable Cove district, near Baker City, now in 100 feet, is expected to cut the ledge at 400 feet; the new Rand drill is in operation.——A 500-foot tunnel is driven on the Gray Eagle; ledge opened up is said to be 5 feet wide.——A mill will probably go in on the Big Limber creek, near Cable Cove. ——A 100-foot crosscut is run on the Morning Star, same district, and drifting is now in progress.

JACKSON COUNTY.

The Gold Hill M. Co. has resumed operations near Jacksonville. —— A recent clean-up at the Jillson, near Hornbrook, weighed nearly ninety pounds after melting.——The Rogue River M. & Lumber Co., W. R. Stansell manager, is working its mines at the head of Foot's creek, near Jacksonville.——G. L. Haff will put in a steam engine on his property in Blackwell district.

J. W. Opp is working the Gold Standard, west of Jacksonville.——The C. & C., in Jump-off-Joe district, is being operated by a Chicago company; Supt. Davis.

JOSEPHINE COUNTY.

J. W. Parker, operating near Leland, will put in an electric plant.——The Fortune M. Co., capital $1,500,000, is incorporated at Grant's Pass, to work property near the Greenback, near there.——A tunnel is being run on the Big Yank, near Galice.——Placering is going on around Grant's Pass; prospects good for a continuance of work.——Work is progressing on the Yankee Boy, at Myrtle creek.

LANE COUNTY.

The Bohemia G. M. Co. has bought the Paradise, in Bohemia district, from Boren & George. The vein is 4 feet wide and the ore is said to assay $50 to the ton.

MALHEUR COUNTY.

A strike is reported on the El Dorado, near Malheur.

SOUTH DAKOTA.

CUSTER COUNTY.

The shaft on the North Star, 8 miles northwest of Custer, now down 300 feet, will be sunk to the 500-foot level.

LAWRENCE COUNTY.

The Castle Rock G. M. Co., capital $1,000,000, is incorporated at Spearfish, and the Blue Stone M. & T. Co., capital $500,000, is incorporated at Deadwood.

LAWRENCE COUNTY.

The twenty-ton cyanide plant, at North Lead, is enlarged to fifty tons capacity. ——The Portland M. Co. of Clinton, Iowa, has its new fifty-ton plant at Central City running.——The new 1200-ton cyanide plant of the Homestake M. Co. at Lead will soon be completed.——It is locally reported that the Golden Reward M. Co. will build a 200-ton cyanide plant at Deadwood.——The Imperial M. Co. of Pennsylvania and the Dakota M. Co. of Deadwood will each build a 100-ton cyanide plant at Deadwood this spring.——The twenty-ton cyanide plant of the Dakota M. Co., at Central City, is sold to Reilley & Barry of the same place. It will soon start up on ore from a mine in Sawpit gulch.

The Shawmut M. Co. of Boston, Mass., which recently bought the old Esmeralda, in Deadwood gulch, Blacktail district, near Deadwood, has erected a fifty-ton cyanide plant on the property. There are six forty-ton cyanide tanks in the mill with a capacity for treating 100 tons of ore per day; two new Huntington mills will go in.——The Boston-South Dakota Co. has completed a 40-stamp mill between the Deadbroke and Esmeralda claims, and it will put in a cyanide annex.

PENNINGTON COUNTY.

The Wealthy group, 4 miles northwest of Keystone, is sold to Sioux Falls men. Work will be pushed.——The Vulcan M. Co. is organized at Keystone to work the Vulcan, 2 miles northwest of Keystone. A steam hoist and mill will go in.——A. D. Arundell of Minneapolis, Minn., will work the Poisoned Ox and Copper Glance properties at Pactola.

UTAH.

BOX ELDER COUNTY.

At the Gold Dust, near Park Valley, twenty-five tons of ore are being put through the mill daily. The capacity of the mill will probably be enlarged this year.

PIUTE COUNTY.

The Banner group, owned by J. P. Osborne, located near Kimberley, is reported sold to Eastern men for $25,000.

SALT LAKE COUNTY.

An assessment of 3 cents per share is levied by the West Mountain Placer Co., Bingham, payable Feb. 23.——The Mystic Shrine Co. is working the Amazon Nos. 1 and 2 and the Navajo; Manager E. W. Young.——The Starlus M. Co. will begin work on the Starlus group.——A company will be organized to work the Montezuma at Bingham; capital $200,000. ——Supt. Brooks of the Butterfield plant has everything in shape for a continuous run.

Work on the Yosemite tunnel, at Bingham, is temporarily suspended.——Work on foundations for the new concentrator to go in on the May Day is begun, and plant is expected to be in operation by March 20th.

SEVIER COUNTY.

Salt from the deposits near Salina is said to be 90% pure.

SUMMIT COUNTY.

The Kennedy group, near Park City, is sold to D. C. McLaughlin, representing the Anchor M. Co., for $20,000.——A carload of machinery for the new Silver King sampler is on the ground.——The new boiler for the Daly-West mill is being put in place. It weighs seven tons.——After a shut-down of about three weeks Loring Bros. have again started up their concentrator. A new boiler was put in during the shut-down.

Supt. J. A. Kirby of the Daly-West, Park City, reports the winze down 80 feet below the 1400-foot level.

WASHINGTON COUNTY.

A small smelting plant was recently built at St. George.——Ore from the Savanic, near St. George, goes 40% copper. ——Mr. Hunzicker, operating property near the Grand Gulch, proposes to put up a plant to treat ore from the sandstone ledges; ore found in the limestone will be sent to the smelter; about one-half of the fuel used at the smelter is coal furnished by beds near St. George.

WASHINGTON.

FERRY COUNTY.

The capital stock of the United States Marble Co. will be increased from 1,500,000 shares to 2,000,000 shares; properties are about 1 mile from Valley.

The drift on the Chico, Republic, is going ahead at the rate of 3 feet per day.——The Silver Dollar is to be sold to Canadian men for $20,000.——New York men may buy the Umatilla.——The raise on the Morning Glory is being run from the 100-foot level.——Work on the Hercules is suspended until spring, owing to influx of water.

Supt. T. E. Dexter reports good progress being made on the Georgie Reed, about 14 miles south of Republic; upper tunnel ledge is 14 inches wide.

A third interest in a group of five claims located on Iron creek, 8 miles from Keller, has been sold to A. A. Redmond of Republic.

OKANOGAN COUNTY.

Mine owners in Slate Creek district are figuring on putting in an electric plant to furnish power for the mines in that section; site chosen is on Slate creek, where, it is said, water power capable of developing from 5000 to 10,000 H. P. is obtainable. ——The crosscut tunnel on the Ninety-Nine is in 240 feet; an air compressor and two Leyner drills will go in early this spring. —— The Lone Star, in Palmer Mountain district, near Loomis, is sold to W. F. Elliott; shaft, now down 40 feet, will be continued to the 100-foot level.

STEVENS COUNTY.

The Bear Mountain M. & D. Co. has three shifts driving a 600-foot tunnel on its group on Bear mountain, 16 miles southeast of Colville; the company will soon start work on Stensgar creek.——A tunnel is being driven on the Copper King on Douglas mountain.

Action for appointment of a receiver for the Uncle Sam M. & Dev. Co. is begun in the Superior Court of the county; properties are 6 miles east of Bossburg.

FOREIGN.

BRITISH COLUMBIA.

The Lenora mine is on Mount Sicker, Vancouver Island, 10 miles from the seacoast, 6 miles from the Esquimalt & Nanaimo railway. The company started active work last February and shipped in 1900 about 7000 tons of copper ore under great difficulties, having to haul by wagons. The company has just completed 6¼ miles of 3-foot gauge railway, and in three months will have completed 5½ miles more to salt water. One hundred tons daily will be sent over the line. The average of the ore so far sent runs $20. The country rock is schist and the belt extends for 12 miles from the salt water toward the interior. The adjoining property, called the Tyhee, is expending $100,000 in purely development work. The machinery will be completed this month, and they will sink a three-compartment shaft for 600 feet. They have already done considerable work, including a 230-foot shaft and crosscuts, and have several other properties which are being opened up on Mount Sicker. The three companies working this district are developing their properties with a view to getting out ore and paying dividends.

Victoria, Jan. 23.

The sampler of the reduction works of the British Columbia C. Co. at Greenwood is running; the new mill building is 70x65 feet and 48 feet high. The present capacity is 700 tons ore per day (twenty-four hours). Six ore bins have a capacity of 3000 tons of ore. The process of sampling is as follows: The ore first goes into a No. 5 Gates crusher, which reduces it to about 4 inches in size; next it goes through a Johnson No. 1 sampler, which takes out one-fifth of the product and rejects the balance, which goes into the sample discard bins below. The one-fifth sample next goes through a No. 2 Gates crusher, which reduces it to 1½ inches. It then drops into a No. 2 Johnson sampler, which takes one-fifth and rejects the remaining four-fifths which pass on to the bins. The sample then goes to a bucket elevator and is carried to the top floor of the building, passing through a shoot back into a No. 0 Gates crusher, which grinds it down to one-half an inch. It then drops into a No. 3 Johnson sampler, which retains one-fifth and discards the balance. The one-fifth passes to a set of 10x20-inch Reliance rolls, crushing to one-eighth of an inch mesh, the whole passing through a second No. 3 Johnson sampler that cuts out one-fifth and sends it to the bucking room. The discarded ore is then taken from the bins direct to the smelter mixture bins for treatment.

On the Phœnix group, at the foot of Erin mountain, near Slocan, the ledge is cut; ore runs about $70 to the ton; T. S. Dunbar, manager.

The Granby smelter, at Grand Forks, treated 3800 tons of ore during the week ending Jan. 19th; ore produced 130 tons of matte.——In the I. X. L., at Rossland, a strike is made in the tunnel below the lower tunnel; ore is said to average $100 to the ton.—— Thirty-five men are employed at the American Boy, at Sandon; more will be put on. No. 6 tunnel is in 400 feet; vein averages 9 feet across and carries 2½ feet of ore. Twenty-five tons of ore running $90 to the ton are shipped weekly; output will be doubled within a month.——The tunnel on the Silver Bell and Golden Crown is in over 125 feet.——It is estimated that there are 120,000 tons of siliceous ore, carrying from $6 to $8 in gold to the ton, on the dump at the Le Roi.——At Deadwood good ore is opened up on the 250-foot level of the Crown Silver. The south drift is in 225 feet and the north drift is in 125 feet; twenty-three men are employed; Supt., H. Johns.——The shaft on the Sunset is down 200 feet.——The shaft on the B. C., in Summit Camp, is down 422 feet; levels are being run at 325 and 400 feet.——Work on the Sunset, near Princeton, will resume in about three weeks.——Three thousand acres of coal lands, 5 miles north of Fairview, in the Yale district, are reported sold to Toronto men; the coal is said to be of good coking quality.

The Iron Mask, at Rossland, is reported bonded to E. D. Leverson of London, England, for $400,000.

Shipments of ore from mines at Rossland for week ending Jan. 26th were as follows:

	Tons.
Le Roi	3,540
Centre Star	2,160
War Eagle	780
Iron Mask	190
Le Roi No. 2	250
Velvet	125
I. X. L.	22
Total	7,067

The tunnel on the Bonanza, Rossland, is in 120 feet.——Sinking is in progress on the Centre Star.——The tramway on the War Eagle is nearing completion; shaft is being sunk and development work is going on in the seventh and eighth levels. ——On the Rossland-Great Western the shaft is down 715 feet; another stope is started on the 600-foot level to the west of the shaft; foundations for compressor are completed and ready for machinery.——The shaft on the Le Roi, now down 900 feet, is to go to the 1500-foot level.——Two shifts are working in tunnel No. 2 of the Big Four; upper tunnel will be extended 50 feet.——Work is under way in the 400, 450 and 500-foot levels of the Iron Mask. ——The 18-drill air compressor now going in on the Velvet will be in operation March 1.——On the Northern Belle the crosscut tunnel is in 365 feet.——The north drift on the new St. Elmo is in 75 feet and the south drift is in 325 feet.——Drifting is in progress on the 100-foot level of the Portland.——Crosscutting is going on in the 300 and 400-foot levels of the Evening Star.

The main tunnel in the Queen Bess, at Alamo Siding, in the Slocan, is in 1700 feet; it is 7x9 feet; progress made so far averages about 100 feet per month.

Finch & Campbell of Spokane, Wash., operating the Second Relief, on Whisky creek, 8 miles from Ymir—R. K. Neill representative—will put in a 20-stamp mill this spring. When in, this will make a total of 120 stamps in the Ymir district. Two hundred and fifty feet of driving will soon be done in the lower level. Seventy-five men will be employed.——Work on the Big Five, near Sandon, resident man-

ager G. B. McDonald, will be resumed soon.

CHINA.

The deepest workings attained on the Cha-li'rh, near Cha-li'rh, are 1500 feet; ore is said to run 3½ ounces gold to the ton.

MEXICO.

The shaft on the La Fortuna, Sonora, is down 300 feet; shaft is only used for hoisting ore, as mine is worked through the La Gloria shaft, 1500 feet distant.——On the La Gloria an incline shaft follows the vein to a depth of 1100 feet; a steam hoist, an 8 drill air compressor, an electric light plant and pump are on the property.——The concentrating plant at La Concentracion, Sonora, has a daily capacity for fifty tons ore.

The Copper Queen Co. of Bisbee, Ariz., has run a 400-foot tunnel on its property at Nacosari, Sonora; it is putting in a railroad to the smelter at that point.

THE KLONDIKE.

The Lucky Day G. M. Co. of Florence, Colo., has sunk the shaft on the Bonanza 175 feet; ore carries white iron and copper, and is said to run $20 in gold and silver to the ton; a new hoisting plant and blacksmith shop are up and two shifts are employed; first shipment of ore will be made shortly to the American Zinc-Lead Works at Canyon City.

Personal.

E. PIERCE, of New York, is in Randsburg, Cal.

R. DARLING, of Denver, Colo., is in Yuma, Ariz.

W. W. LOWE of Long Beach, Cal., has gone to Mexico.

T. L. AYRES of San Francisco, Cal., is in Kingman, Ariz.

W. J. SHARWOOD of Marysvale, Mont., is in San Francisco.

W. E. JOHNSON of Florence, Colo., is in Salt Lake, Utah.

ROSS E. BROWNE of San Francisco is in Grass Valley, Cal.

G. S. PEYTON has returned to Salt Lake, Utah, from the East.

J. F. AUSTIN, formerly of the Germania smelter, Salt Lake, Utah, goes to Everett, Wash., to take charge of a 300-ton plant at that point.

B. E. SHEARER of Denver, Colo., is in Salt Lake, Utah.

J. MURRAY is appointed receiver Marie Co., Cripple Creek, Colo.

SUPT. KIRBY of the Daly-West, Park City, Utah, is in San Francisco.

A. J. MCDONNELL has taken charge of the Union Con. mine, Virginia, Nev.

E. E. FLOYD of the Mass Con. M. Co. has resigned as president and director.

A. BURCHAM, president Yellow Aster Co, Randsburg, Cal., is in San Francisco.

T. H. OXNAM has returned to Los Angeles, Cal, from inspection of the Palmarego, Mexico, mine.

J. W. CUSHING of Sandy, Utah, goes to East Helena, Mont., as overseer in the sampling plant at that place.

ADOLPHE CARNOT has been appointed director Paris School of Mines, succeeding Haton de la Goupilliere.

W. H. KNOWLES, Supt. Crown Point and Virginia, Idaho Springs, Colo., has returned there from Chicago.

Books Received.

"Chemists' Pocket Manual," pp. 204; Richard K. Meade: Designed for use of chemists, assayers and metallurgists; a useful compendium of formulæ, calculations, tests and tables, conveniently indexed. Price, $2. The Chemical Publishing Co., Easton, Pa.

"Handbook of Practice," 8vo., pp. 164; D. H. Bergey: A laboratory guide as to sanitary analysis and ventilation. Price $1.50. The Chemical Publishing Co., Easton, Pa.

"Elementary Organic Analysis," 8vo., pp. 86; F. G. Benedict: Determination of carbon and hydrogen; combustion of various bodies. Price $1. The Chemical Publishing Co., Easton, Pa.

"Evolution of the Thermometer," 12mo., pp. 96; H. C. Bolton: An illustrated history of the thermomter, with descriptions and comparisons of the various kinds. Price $1. The Chemical Publishing Co., Easton, Pa.

"A Textbook of Urine Analysis," 8vo., pp. 244; Jno. H. Long: Illustrated; for medical students and medical practitioners; chemical physiology, with microscopic tests. The list of reagents and test solutions is unusually complete. Price $1.50. The Chemical Publishing Co., Easton, Pa.

"A Plain Statement of the Law Relating to the Location of Mining Claims, Including the State and Territorial Laws of Nevada, Arizona and Alaska," is the title of a concise compilation in handy form written by C. W. Hollister, Ph. D., and published by Wm. T. Smith & Co., assayers, of Los Angeles, Cal., at 15 cents per copy.

"Reservoirs for Irrigation, Water Power and Domestic Water Supply, With an Account of Various Types of Dams and the Methods and Plans of Their Construction," large 8vo., pp, 432, 183 figures, 25 plates; James Dix Schuyler. The present interest in the subject suggests demand for technical information thereon, and this work is to be commended for its complete and practical nature. The chapters on rock-fill dams, hydraulic-fill, masonry, and earthen dams, natural and projected reservoirs, are accurate and clear. Particular attention is paid to the west half of America, and the principal existing dams on the Pacific coast are illustrated and described. Published by John Wiley & Sons, New York City; $5.

Commercial Paragraphs.

THE Otis Elevator Co., of New York and Chicago, is represented in Denver by J. F. Elan.

D. HUG, patentee and manufacturer of the Hug water wheel, Denver, Colo., has moved into larger shop quarters at 1514 Blake street, where his facilities for turning out work will be increased.

A. E. LINDROOTH, Denver manager Link-Belt Machinery Co., and H. H. Fielding, manager Denver branch for Warren Webster & Co., have moved their offices to 822 Boston Building, Denver, Colo.

THE Gutta Percha & Rubber Mfg. Co. state they have had a larger volume of business for the past year than during any year since their being established in San Francisco. This they attribute to the universal satisfaction which their Maltese Cross belting has been giving.

Recently Declared Mining Dividends.

	Payable.
Old Colony Zinc & Smelting Co., Missouri, 2½%, $27,500	Feb. 1
Atlantic M. Co., Michigan, $2 per share, $80,000	Feb. 9
Utah Con. (Highland Boy) M. Co., Utah, $1.25 per share, $375,000	Mar. 1
Stratton's Independence, Colorado, 7th interim, for three months ended Dec. 31, 1900, 10% per annum	Jan. 15
Atlantic M. Co., Michigan, $2 per share	Feb. 9
Quincy M. Co., Michigan, semi-annual dividend, $3 per share	Feb. 25
Utah M. Co., Utah, $1.25 per share, $125,000	Mar. 1
Lightner M. Co., California, 2½%, $3125	Feb. 1

List of U. S. Patents for Pacific Coast Inventors.

REPORTED BY DEWEY, STRONG & CO., PIONEER PATENT SOLICITORS FOR PACIFIC COAST.

FOR THE WEEK ENDING JAN. 22, 1901.

666,371.—ROTARY ENGINE—A. F. Baatz, Fairhaven, Wash.
666,372.—ALARM FOR GUNS—W. T. Baggett, S. F.
666,405.—ALARM FOR GUNS—W. T. Baggett, S. F.
666,456. — WAVE MOTOR — Banning & Carey, Los Angeles, Cal.
666,475.—CAR COUPLING—H. G. Dunston, Santa Monica, Cal.
666,615.—WEIGHING MACHINE—E. Hanak, S. F.
666,526.—LADDER—J. J. Howard, Grass Valley, Cal.
666,607.—PAINTING CANS—J. H. Hughlett, Blaine, Wash.
666,479.—SICKLE GUIDE—J. T. Lightner, Red Bluff, Cal.
666,435.—TABLE—D. F. Oliver, Oakland, Cal.
666,568.—SIGNATURE GATHERER—J. E. Smyth, Pasadena, Cal.
666,580.—HOSE NOZZLE—J. P. Van Sickle, Pasadena, Cal.
33,976.—DESIGN—E. L. Fissell, Davisville, Cal.

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Latest Market Reports.

SAN FRANCISCO, Jan. 31, 1901.

SILVER—Per oz., Troy: London, 27¾d (standard ounce, 925 fine); New York, bar silver, 60c (1000 fine); San Francisco, 60c; Mexican dollars, 50c.

The continued fall in silver is attracting attention. Just now the Indian Government is the only buyer, taking about $150,000 worth a week; the amount received from New York alone is about $250,000 weekly. San Francisco shipments are not unusually heavy.

COPPER.—New York: Lake, 1 to 3 casks, $17.00; carload lots, 16.75; Electrolytic, 1 to 3 casks, 16.75; carload lots, 16.50; Casting, 1 to 3 casks, 16.50; carload lots, 16.37½. San Francisco: 18. Mill copper plates, 20c; bars, 22@23c.

The 1900 export of fine copper from the United States to Great Britain was 28,218 tons.

LEAD.—New York, $4.37½; Salt Lake City, $4.00; St. Louis, $4.20; Missouri lead, $4.32½ desilverized lead; San Francisco $5.00, carload lots; 5½c 1000 to 4000 lbs.; pipe 6¾, sheet 7½, bar 6c; pig, $4.70 @5.10. London, £15 9s per ton.

During 1900 Great Britain imported from the United States 40,724 long tons lead, mostly Mexican, refined in this country in bond.

SPELTER. — New York, $4.10; St. Louis, $3.90; London, £18 6s per ton; San Francisco, ton lots, 5¼c; 100-lb lots, 6c.

ANTIMONY.—New York, Cookson's, 10c; Hallett's, 9½c; San Francisco, 1000-lb lots, 12c; 300 to 500 lbs., 13@14c; 100-lb lots, 15@18c.

IRON.—Pittsburg, Bessemer pig, $13.30; gray forge, $13.40; San Francisco, bar, per lb., 2.65c in small quantities.

STEEL.—Bessemer billets, Pittsburg, $19.60; open hearth billets, $21.00; San Francisco, bar, 7c to 12c per lb.

TIN.—New York, pig, $26.25; San Francisco, ton lots, 29c; 1000 lbs., 29¼c; 500 lbs., 29½c; less, 30c; bar tin, ℔ lb, 35c.

QUICKSILVER. — New York, $51.00 large lots; London, £9 2s 6d; San Francisco, local, $47.50 ℔ flask of 76½ lbs.; Export, $44.

NICKEL.—New York, 50@60c ℔ lb.

MAGNESIUM.—New York, $2.90 ℔ lb.; San Francisco, $3.75.

ZINC.—San Francisco, 5¼c; slab, 5¾c; bar, 7c.

BABBITT METAL.— San Francisco, No. 1, 10c.

SOLDER. — Half-and-half, 100-lb. lots, 18½c; San Francisco, Plumbers', 100-lb. lots, 15½c.

ASSAY LITHARGE.—San Francisco, 10c ℔ lb, small lots.

BISMUTH.—New York, ℔ lb., $2.25 50-lb lots; San Francisco, $2.50 to $2.75 lb lots.

PLATINUM.—San Francisco, crude, $17 ℔ oz.; New York, $18.20 per Troy oz

ALUMINUM.—New York, No. 1, 99% pure ingots, 35c; No. 2, 90%, 30c to 35c.

FERRO-MANGANESE. — Pittsburg, 80%, domestic, $62.50, large lots.

PHOSPHORUS.—F. o. b. New York 50@60c ℔ lb.

POWDER.—F. o. b. San Francisco: No. 1. 70% nitro-glycerine, per lb., in carload lots, 15½c; less than one ton, 17½c. No. 1*, 60%, carload lots, 13½c; less than one ton, 15½c. No. 1** 50%, carload lots, 11¾c; less than one ton, 13¾c. No. 2, 40%, carload lots, 10c; less than one ton, 12c. No. 2* 35%, carload lots, 9½c; less than one ton, 11½c. No. 2** 30% carload lots, 9c; less than one ton, 11c. Black blasting powder in carload lots, minimum car 728 kegs, $1.50 per keg; less car lots, $2 per keg.

CAPS.—3x, $5.50 per 1000; 4x, $6.50; 5x, $8; Lion, $9, in lots not less than 1000.

FUSE.—Triple tape, $3.60 per 1000 feet; double tape, $3.00; single tape, $2.65; Hemp, $2.10; Cement No. 2, $3.00; Cement No. 1, $2.65, in lots of 3000 feet and up.

CANDLES.—Granite 6s, 16 oz., 40s., 11½c ℔ set; 14 oz., 40s., 10c.

CHEMICALS.—Cyanide of potassium, 98%-99%, jobbing, 32½@33½c ℔ lb.; carloads, 30@31c; in 10-lb. tins, 40c; sulphuric acid, in carboys, 66% B, 2c ℔ lb.; soda ash, $1.60 ℔ 100 lbs. 58%; hyposulphite of soda, 2¾@3c ℔ lb.; blue vitriol, 5½@6c ℔ lb.; borax, concentrated, 7@8c ℔ lb.; chlorate of potash, 12@13c; roll sulphur, 6c; alum, $1.90@2.00; flour sulphur, French, 2¼@2½c; California refined, 1¾@2c; nitric acid, in carboys, 8c ℔ lb.; caustic soda, in drums, 3@4c ℔ lb.; Cal. s. soda, bbls., $1.00; sks, 95c ℔ 100 lbs.; chloride of lime, spot, $2.50@2.60; nitrate of potash, in kegs, 8c; caustic potash, 10c in 40-lb. tins.

TUNGSTEN.—New York, ℔ lb., 95c; San Francisco, $1.15.

FERRO-TUNGSTEN. — New York, 37%, 32c; San Francisco, 65c (60%).

AUTOMATIC SAMPLING
Mill Plans, Cyanide, Concentration, Smelter.
F. D. BAKER, Mech. Engr., DENVER.

SITUATIONS WANTED.

WANTED—A position as superintendent for a mining company by a man of 16 years' practical mining experience; understands mining and milling (amalgamation, concentration and leaching); good assayer and accountant; would accept a subordinate position if good; references. Address "Advertiser," 1225 Webster St., Oakland, Cal.

A position as superintendent or mining foreman by a man of 20 years' practical experience in mining in all its branches in the different mines in California and Mexico—gold, silver, copper and quicksilver mines. Have had the handling of large forces of men. Can speak Spanish. Can go through and secure any kind of ground. The best of references. D. E. F., care this office.

A sober, industrious young man, who is a competent assayer, surveyor, draughtsman and bookkeeper, wishes a situation. Has had eighteen months' practical experience and two years' technical training. Is willing to make himself generally useful about a mine. Salary reasonable; opportunity to show ability considered first. References. Address R. M., Mining and Scientific Press.

CHEMIST AND ASSAYER, with experience in draughting, bookkeeping and typewriting, desires position as assayer or assayer and bookkeeper in mine or as secretary to mining engineer or mine official. Has fair literary and scientific education. Experience in the preparation of reports, prospectuses and catalogues. Excellent moral character and good health. For further particulars, address E. K. M., care Mining and Scientific Press.

Situation Wanted by Mining Engineer of 20 years' experience in California, Colorado, Mexico and Germany. Has had charge of large properties—gold, silver, lead, copper, sulphur and oil. College graduate; good assayer, surveyor and accountant; speaks Spanish. Has experience in railroad construction and road building. Formerly U. S. deputy mineral surveyor and member of geological field force. Will go anywhere. Address P. M., Mining and Scientific Press.

Mining Accountant and Store Manager.

A young man of energy and ability, and thoroughly experienced in all details of mine accounting, store managing, buying, contracting, etc., is desirous of obtaining an opening. Is fully qualified to assume full charge of such work or to render general assistance. Highest references will be furnished and satisfactory services guaranteed. Address B. P. O., this office.

WANTED.

MINE PROMOTER WANTED

To influence capital in A1 developed gold mine near Buffalo Hump, Idaho. Address Mineral Recorder, Elk City, Idaho.

WANTED--GOOD SECOND-HAND SET CRUSHING ROLLS.

State price and particulars to THE MOUNTAIN COPPER CO., LTD., Keswick, Shasta Co., Cal.

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Assayer, Chemist and Surveyor,
with Surveying Instruments.

Must furnish good references as to character and ability and from previous positions. Give age; experience. Single man preferred. Steady work. Wages $75 per month and board.

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Over 12 feet wide; values $5 to $30, gold and silver. Mine can be developed cheaply by tunnels to depth of 600 feet. Many improvements; 1500 feet work done; buildings up, and good road; timber and water. Prospect for a big mine seldom equaled. Lease and bond on favorable terms. D. S. M., care this office.

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Gold, Silver-Lead and Copper Properties. Excellent chance for profitable investments in legitimate mining in BRITISH COLUMBIA. Capital needed for developing promising prospects. A specialty made of FREE MILLING GOLD properties. Very promising FREE MILLING GOLD properties for sale; terms reasonable. Mines examined and reported on by reliable mining engineers. Correspondence solicited. Address Andrew F. Rosenberger, P. O. Box 700, Nelson, B. C.

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34-40 FIRST STREET, SAN FRANCISCO.

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WILL DO IT FOR YOU.
Ask for Pamphlets Telling How.
AN INDESTRUCTIBLE WATER PIPE.
Cheap Irrigation Pipe Also.
SPOKANE GALVANIZED WIRE PIPE CO.
SPOKANE, WASH.

FOR SALE.

FOR SALE.
Developed Silver-Lead Mines and Prospects,
Parral and Santa Barbara Districts of Mexico.

The coming greatest camp in the Republic. Correspondence solicited

H. E. RUNKLE, El Paso, Texas.

COMPRESSOR AND HOISTS FOR SALE.

1 4-drill Norwalk steam compressor, compound air cylinders.
1 6″x8″ double engine, single reel hoist.
1 8″x10″ double engine, double reel hoist.
1 double reel water or steam hoist.

Machinery all practically new. Convenient for inspection. Address "BARGAIN," P. O. Box P, Auburn, Cal.

GUARANTEED MINING STOCK FOR SALE.

Excellent chance for profit. No chance for loss. Can convince the most skeptical that our way of guaranteeing mining stock is perfectly safe and one of the most desirable investments. Can furnish highest grade of references. Write or call for particulars, if you wish to purchase, on

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Marquette, Mich. Washington, D. C.

ORE CARS AND BUCKETS.

Best cars made, and guaranteed in every way. From $25.00 up. Can save you 25 per cent on any size car.

Send for Catalogue No. 37.

THE S. H. SUPPLY CO.,
22nd and Larimer Sts., DENVER, COLO.

NOTICE OF AMENDMENT OF ARTICLES OF INCORPORATION.

Notice is hereby given that it is the intention of the JAMISON MINING COMPANY to amend its Articles of Incorporation by substituting for the second of said articles setting forth the purposes of the Corporation, which now reads:

"2nd. That the purposes for which it is formed are: The acquisition of quartz mines and gravel mines in the State of California, and to work the same for gold and silver; also, to acquire, hold and use water and water-rights and privileges in connection with such mining; also, to acquire, hold and use timber lands in connection with such mining," the following:

Second:—That the purposes for which it is formed are: To mine for, and mill and reduce ores of all kinds; to acquire by location, purchase or otherwise, to own, hold, work and operate mines in and throughout the State of California; to acquire by purchase or otherwise, to own, hold, develop, improve, lease, let, mortgage, grant, bargain, sell and convey mines, and mining claims and properties in the State of California; to acquire, by purchase or otherwise, to build, erect, construct, own, operate, lease, let, mortgage, grant, bargain, sell and convey mills, and other reduction and smelting works, for the milling and reduction and smelting of ores, and to deal in precious metals and minerals and the products of mines of every kind, and to transport and provide ways and means to transport the same to market, and to market and sell the same; to acquire, by purchase or otherwise, to improve, develop, own, hold, use, lease, let, mortgage, grant, bargain, sell and convey real property, lands, water, water-rights, privileges, and franchises of every kind, in and throughout the State of California; to buy, own, hold, sell and generally deal in goods, wares and merchandise, and all kinds of personal property, including the stocks of other corporations, also bonds, notes and personal securities of every kind. To establish and maintain agencies of said Corporation, and to appoint and employ agents, wherever it may be deemed best by said Company; and generally to do any and everything necessary, proper or expedient to carry out the aforesaid purposes and carry on the business of said Corporation.

NOTICE OF STOCKHOLDERS' MEETING.

A Special Meeting of the Stockholders of the JAMISON MINING COMPANY for the purpose of considering and acting upon the matter of Amending its Articles of Incorporation, as above provided, will be held at the office of the company, room 54, 120 Sutter street, San Francisco, California, at two o'clock P. M. on Monday, the 11th day of February, 1901.

By order of the Board at its meeting of December 31st, 1900. SAM W. CHEYNEY, Secretary Jamison Mining Company.

BEST CONVEYOR FOR FEEDING ORE CRUSHERS.

WE BUY very rich Ores, Dental Scraps, Tellurium Ores, Mill Wastes, Jewelers' Sweeps, Gold Retorts, Old Iron Retorts, Base Amalgam, Quicksilver, Amalgamated Plates, Gold and Silver, Old Slags.

A. M. DONALDSON & CO.,
ASSAYERS AND WASTE PRODUCT SMELTERS,
1661 Larimer St., Denver, Colo.
Donaldson's Assayers' Slag Hammer { 1 lb. ..... $1.10 / 1 lb. 3 oz. $1.25

Electric, Railway and Manufacturers' Supply Co.
548 MISSION ST.,
SAN FRANCISCO, CAL.

RAILWAY SUPPLIES AND ELECTRICAL SPECIALTIES.

Pacific Coast Agents : : : : : : : : :
ERICSSON TELEPHONE COMPANY.

WE CARRY FULL LINE OF ABOVE GOODS.

DRY PLACER MACHINES.

THE PNEUMATIC PROSPECTOR.
Size 6x11x14 in. Weight only 10 lbs.

PACKED FOR MOVING.

NO WATER NEEDED.

Gives a clean prospect from placer ground or free-milling ore by compressed air. The operation is purely mechanical. No chemicals, no quicksilver; no black sand remains with the gold. Will work equal to careful panning.

THE PNEUMATIC SEPARATOR.
Weight 160 lbs.

Has a capacity of 20 to 30 cu. yds. of gravel per day. Will save fine and coarse gold and nuggets of any size, comparatively free from black sand. Will do better work under favorable circumstances than a sluice box. Indispensable for dry countries.

SEND FOR DESCRIPTIVE CIRCULAR.

P. P. CUPLIN,
Inventor and Manufacturer,
WEST BEND, IOWA, U. S. A.

DIAMOND DRILLS
FOR PROSPECTING.
AMERICAN DIAMOND ROCK DRILL CO.
120 LIBERTY ST. N.Y.

Established 1837.
I. C. Yawger,
Successor to VICTOR BISHOP & CO.

IMPORTER OF CARBONS FOR DIAMOND DRILLS.

21 Maiden Lane, - NEW YORK.

BENJAMIN T. LLOYD, STOCKS, BONDS AND MINES.

Have immediate customers for well-developed Gold and Copper Properties.
P. O. Box 608, SALT LAKE CITY, UTAH.

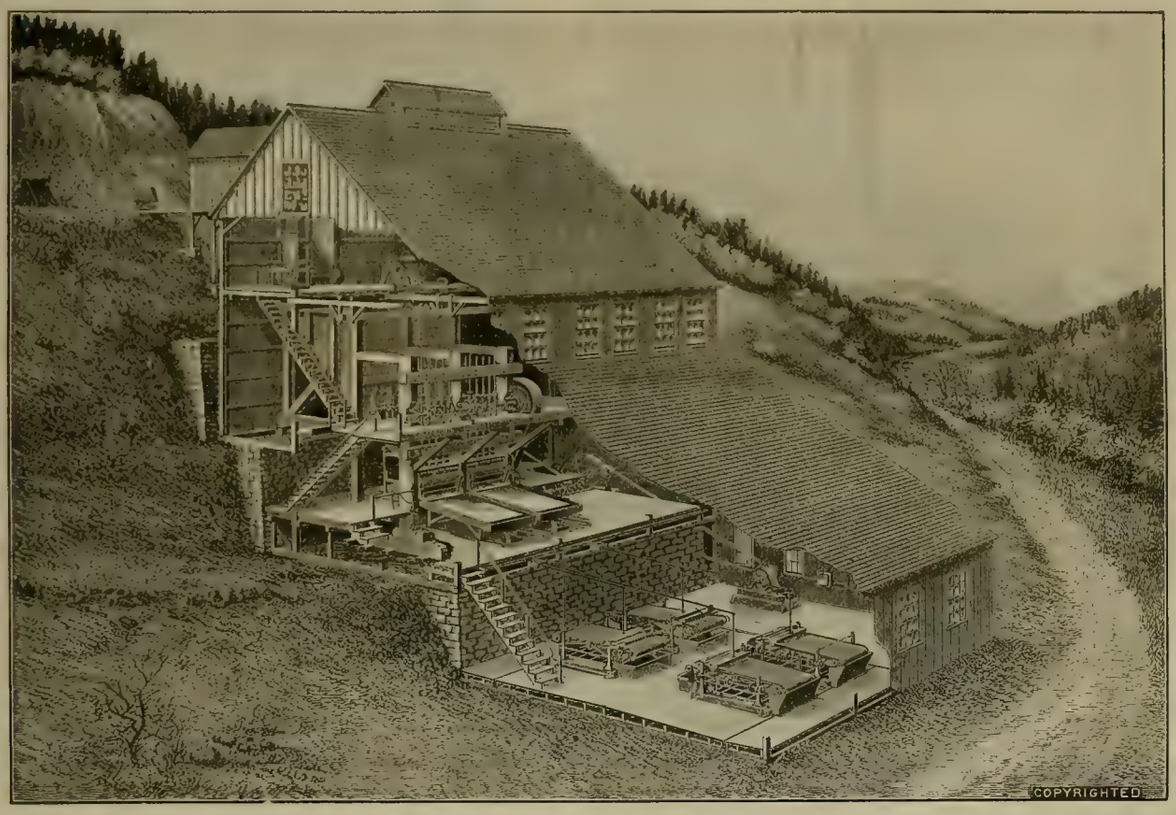
THE BRETHERTON HOT BLAST.

APPARATUS FOR PYRITIC SMELTING. It saves fuel, increases capacity of furnace, improves character of work, does not require a hot top causing volatilization like other inventions, furnishes pure air heated without cost, can be attached to furnaces already in use, is an all around money saver, built and used by practical, successful metallurgists. Write for particulars to

THE BRETHERTON HOT BLAST SMELTING COMPANY, Mining Exchange Building, Denver, Colo.

UNION IRON WORKS,

222 Market Street, San Francisco, Cal.



Builders of All Classes of Mining Machinery.

The above is an illustration of a First-Class Modern 10-Stamp Gold Mill. For particulars, send for Catalogues.

Carefully Tested.

Each and every injector we make is carefully tested before it leaves our factory, and card attached showing its exact range. When you buy a

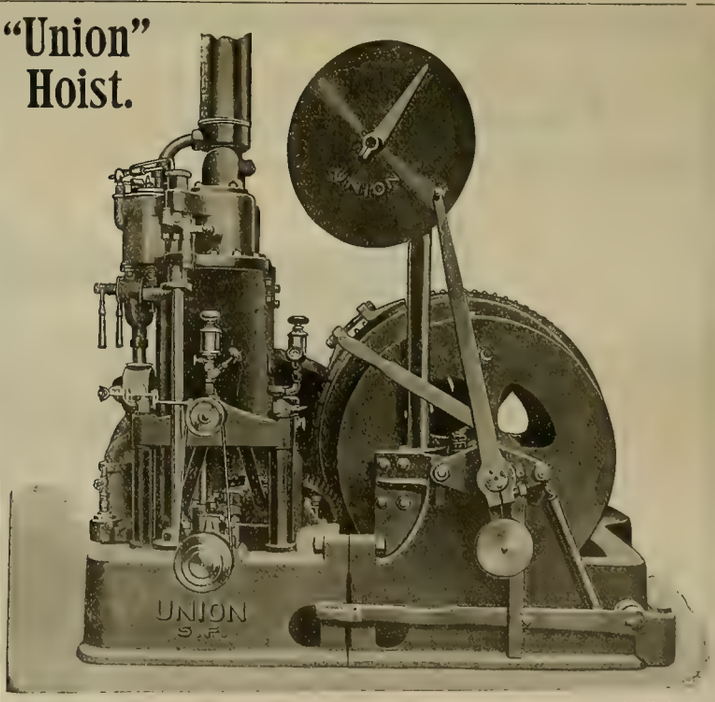
U. S. Automatic Injector

you are getting the best injector on the market. Fully guaranteed as per card attached.

Our "Engineers' Red Book" will be valuable to you. It's free for the asking. Write us.

AMERICAN INJECTOR CO.,
Detroit, Mich.

"Union" Hoist.



The above illustrates the 25 H. P. double cylinder, single drum "Union" hoist, with all the latest improvements.

THE UNION GAS ENGINE CO.

—BUILD THE—

"Union" Gas Engines,

Which use either MANUFACTURED or NATURAL GAS, ORDINARY STOVE GASOLINE (NAPHTHA or BENZINE), DISTILLATE or KEROSENE.

STATIONARY ENGINES for All Kinds of Work in Sizes from 3 to 300 h. p. in actual use.
"UNION" COMBINED HOISTS in Sizes from 2 to 130 h. p. in actual use.
"UNION" COMBINED COMPRESSORS—20, 30, 40 h. p.
HOISTS and COMPRESSORS Can Be Built in Larger Sizes to Order.
UNION" MARINE ENGINES, 4 to 200 h. p., of Single, Double and Four-Cylinder Types.
FIFTEEN YEARS' EXPERIENCE Building Gas and Oil Engines.
"UNION" ENGINES Are In Use All Over the United States.
"UNION" ENGINES Are Simple, Durable and Economical.

Office, 248 First Street. Works, Corner First and Clementina Streets. SAN FRANCISCO, CAL.

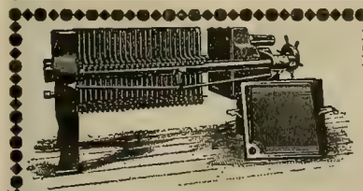
WEST COAST OF MEXICO.

WÖHLER, BARTNING Suc's, Mazatlan (Sinaloa), Mex.

Bankers, Importers, Exporters and Commission Merchants.

Representatives and Agents of the principal Mining Companies in the State of Sinaloa and the dependencies of the Pacific coast in the States of Durango, Chihuahua, Sonora, Lower California and Jalisco.

ORE BUYERS AND EXPORTERS. - MINING SUPPLIES.



FOR Removing Slimes

BROMINE
CYANIDE
CHLORINATION
And Other Aquarious Chemical Solutions.

Our FILTER PRESS

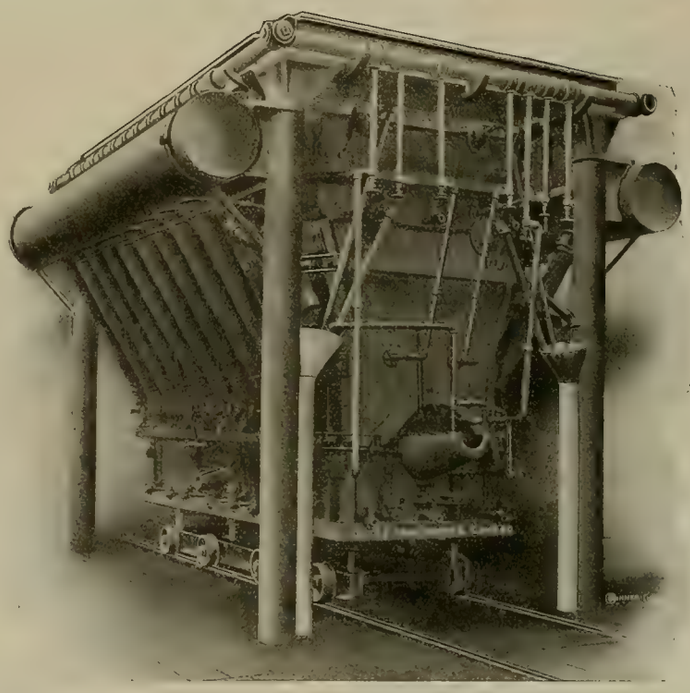
Removes all Slimes and Hastens the Deposition of the Metals.

THE STILWELL-BIERCE & SMITH-VAILE CO., 276 Lehman St., Dayton, Ohio. Risdon Iron & Locomotive Works, San Francisco, Cal.; C. B. Boothe & Co., Los Angeles, Cal., Sales Agents.

GATES IRON WORKS

The Copper Furnace herewith reproduced is one of two sold to the GRANBY CONSOLIDATED MINING AND SMELTING CO., LTD., BRITISH COLUMBIA. The size is 44x160 inches. These two furnaces were sold on a guaranteed capacity of 500 tons per day. Before the furnaces had been in operation a month they developed an average capacity of 600 tons per day, and the highest daily record has exceeded 735 tons. The cost of operation has steadily declined under the management of General Manager Hodges, until six-dollar copper ore is paying a handsome profit.

FULL DETAILS OF OUR SMELTING FURNACES GIVEN IN OUR NO. 11 BOOKLET.



All of GATES IRON WORKS machinery is as good as it is represented to be, and often much better. We build every modern type of apparatus for the reduction of the precious ores by every established process. Our three great lines are these:

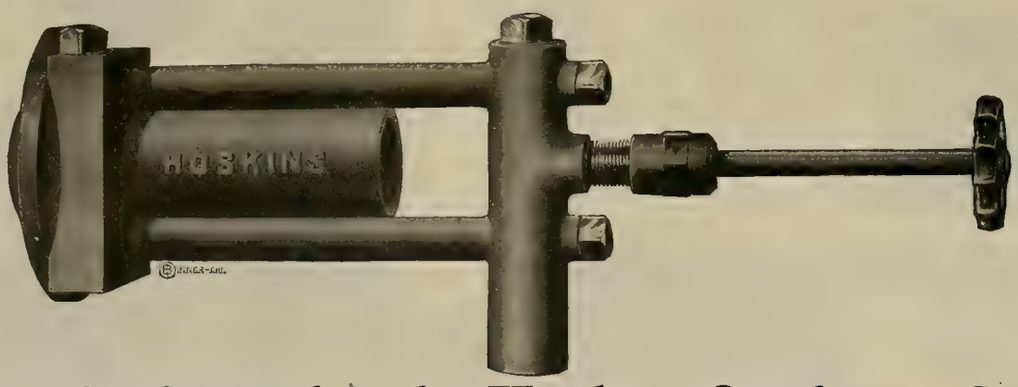
Mining Machinery, Rock and Ore Crushing and Cement Machinery.

WE BUILT THE FIRST STAMP MILL ERECTED IN THE ROCKY MOUNTAINS.

WE PUBLISH FOR THE USE OF INTERESTED PEOPLE, 17 BOOKLETS DESCRIBING OUR MACHINERY.

Main Office and Works, 650 Elston Ave., CHICAGO.

We introduced the use of Liquid Fuel Furnaces for Assaying twenty years ago, and received the only award and medal for Hydro-Carbon Blow-Pipes and Assay Furnaces at the World's Fair in 1893. We are still manufacturing



Hoskins' Standard Hydro-Carbon Burner

FOR ASSAY FURNACES.

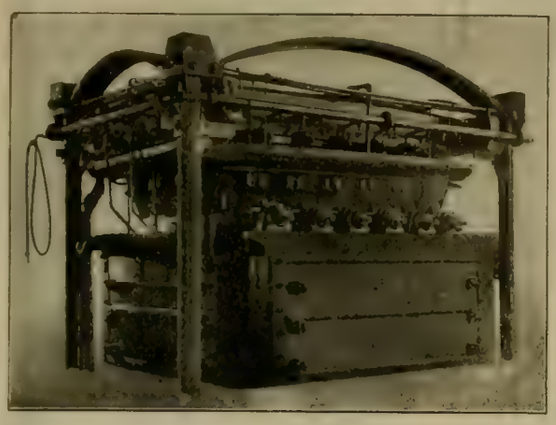
Always guaranteed and cleaned or repaired FREE of charge.

For sale by Dealers in Assayers' Supplies everywhere, or by Ourselves.

All inquiries fully answered. Write for circulars and prices of our TIME PROVEN FURNACES FOR ASSAYERS.

WM. HOSKINS & CO.,
81 SO. CLARK STREET, CHICAGO, ILL.

THE COLORADO IRON WORKS COMPANY,



ENGINEERS AND MANUFACTURERS OF

Smelting Furnaces and Equipments.

The illustration in this advertisement shows one form of our COPPER MATTING FURNACE, employing hot blast; the air being first treated in proper appliance, is conducted through the cast iron bustle pipes placed along the inside of the caisson plates, through the cast iron adjustable tuyeres. This furnace can also be used for silver as well as copper smelting, by changing lining in crucibles. We build them in any size required.

Cold blast may be used if preferred.

The furnace is equipped with our special cast iron jackets, and our patented system of water-jacketed mantles.

Send for our catalogue, showing many different styles of smelters for the treatment of

GOLD, SILVER, LEAD, COPPER AND NICKEL ORES,

also the latest and best method for the economical use of jacket water (a saving of 80% to 90% guaranteed) by our patented

WATER VAPORIZING ATTACHMENT.

☞ We design, manufacture and erect Mills for Concentration and Amalgamation, Milling, Chlorination and Cyanide Processes. In writing for information, give us the analysis or character of the ore to be treated, to enable us to intelligently arrive at the proper method.

Our very complete catalogue of CRUSHING MACHINERY will be sent on application.

THE COLORADO IRON WORKS COMPANY,

ESTABLISHED 1860. DENVER, COLORADO, U. S. A.

THE MINE AND SMELTER SUPPLY CO.,

DENVER, - - COLORADO.

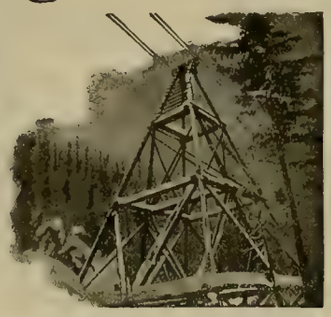
Mining and Milling Machinery and Supplies.

We beg to call your attention to

THE FINLAYSON PATENT WIRE ROPE TRAMWAY—

the latest and best system of double-rope automatic aerial tramway in the market.

If interested in the most economical system of transporting ores from mine to mill and to shipping stations, send for our special tramway catalogue.



We carry a complete stock of Machinery and Supplies for immediate delivery.

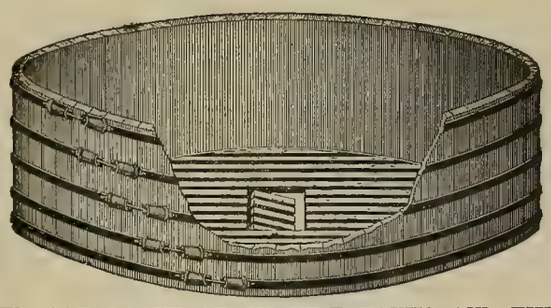
Send for our special catalogues on Mining Machinery, Milling Machinery, Wilfley Concentrators, Tramways, Power Transmission Machinery, Machine Tools, Etc.

THE MINE AND SMELTER SUPPLY CO.,.....Denver, Colorado
THE MINE AND SMELTER SUPPLY CO.,.....Salt Lake City, Utah
THE MEXICO MINE AND SMELTER SUPPLY CO.,
No. 16 San Francisco St., City of Mexico.

BOILERS, ENGINES, STEAM HOISTERS, ELECTRIC HOISTERS, ROLLS, CRUSHERS, WILFLEY TABLES, CARS, CAGES, ORE BUCKETS, RAIL, PIPE, FITTINGS, BELTING, ETC., ETC.

CYANIDE TANKS! MINING

LEACHING TANKS,
SOLUTION "
SUMP "
WATER "
EXTRACTION BOXES.



Estimates Furnished for Complete Cyanide Plants.

SEND FOR ILLUSTRATED CATALOGUE OF CYANIDE TANKS AND FIXTURES, MAILED FREE.

Pacific Tank Co., Manufacturers, 35 Beale St., San Francisco, Cal. 348 EAST SECOND STREET, Los Angeles, Cal.

CHAS. C. MOORE & CO.,

ENGINEERS,

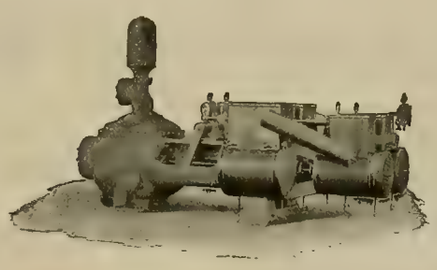
AND DEALERS IN : : : :

High Grade Machinery.

COMPLETE PLANTS INSTALLED.

32 First Street,

Branches—Los Angeles, Seattle. San Francisco, Cal.



Pacific Coast Office

The Babcock & Wilcox Company,

PATENT WATER TUBE

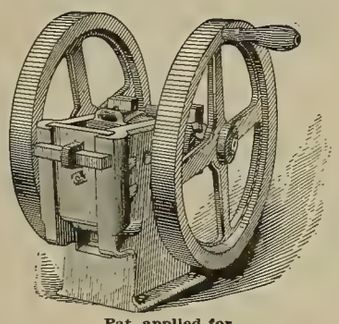
STATIONARY BOILERS & MARINE

CHAS. C. MOORE,

MANAGER,

32 FIRST STREET, SAN FRANCISCO, CAL.

Time, Labor and Money Saved for Assayers.

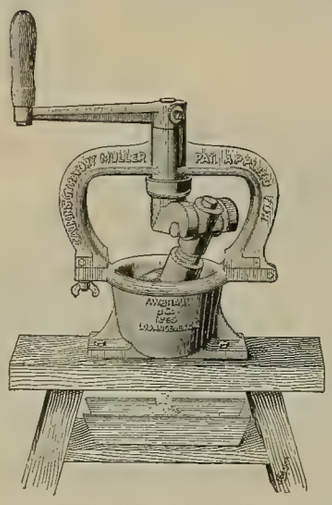


Pat. applied for.

THE SIMPLEX ORE CRUSHER.

For crushing and pulverizing small quantities of ore by either hand or power. It is more easily operated than any other machine of its capacity on the market.

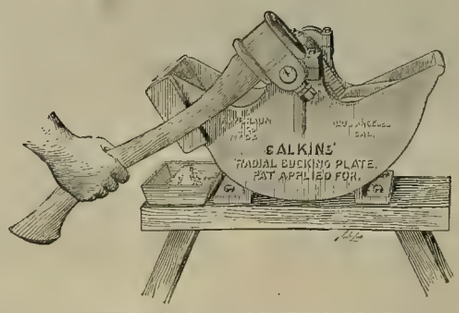
Its features are ease of opening for cleaning and simplicity of adjustment.



CALKINS' GYRATORY MULLER.

A recent invention for reducing crushed ore samples to a pulp. Will quickly pulverize to 100 mesh or finer.

Supersedes the slow and laborious Bucking Plate.



CALKINS' RADIAL BUCKING PLATE.

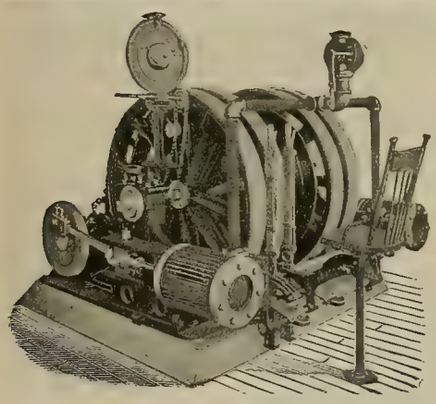
Designed to replace the old method of pulverizing crushed ore samples to a pulp of any desired fineness with but a fraction of the energy required to operate the old style Bucking Board and Muller.

WRITE FOR OUR NEW DESCRIPTIVE PAMPHLET IN WHICH : ALL OUR NEW SPECIALTIES ARE FULLY DESCRIBED. :

F. W. BRAUN & CO.,

Manufacturers of Modern Appliances for Assayers,

LOS ANGELES, CAL.



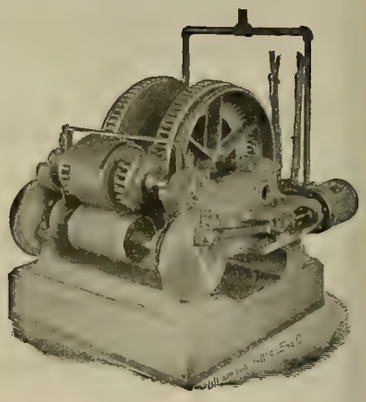
BOLTHOFF'S HOISTING ENGINES

ARE POPULAR

Wherever Used

AND

Used Everywhere.

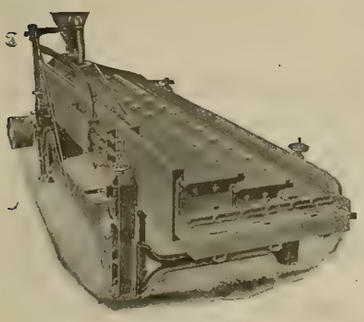


SEND FOR OUR SPECIAL HOISTING MACHINERY CATALOGUE.

The Hendrie & Bolthoff M'f'g & Supply Co.

No. 37. DENVER, - - - - - - COLORADO.

THE IMPROVED BARTLETT CONCENTRATING TABLE.



The only table made that will take the place of jigs and do away with costly and complicated machinery.

Especially designed for separating zinc from lead.

Solid Iron Tops, planed to a true surface.

All parts are interchangeable.

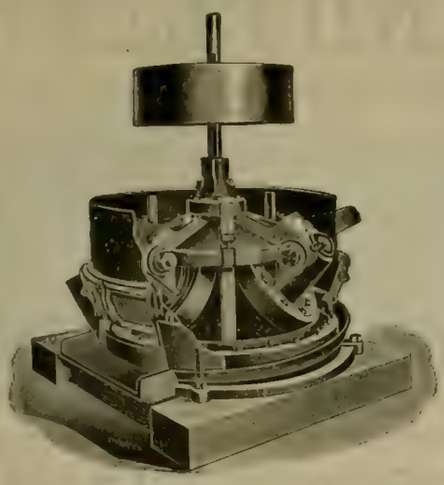
Wearing parts reduced to a minimum.

Capacity from 15 to 45 tons in 24 hours, according to class of ore.

Our illustrated catalogue contains all the latest information on the concentration of ores. Mailed on application.

THE COLORADO IRON WORKS CO.,

Established 1860. DENVER, COLO., U. S. A.

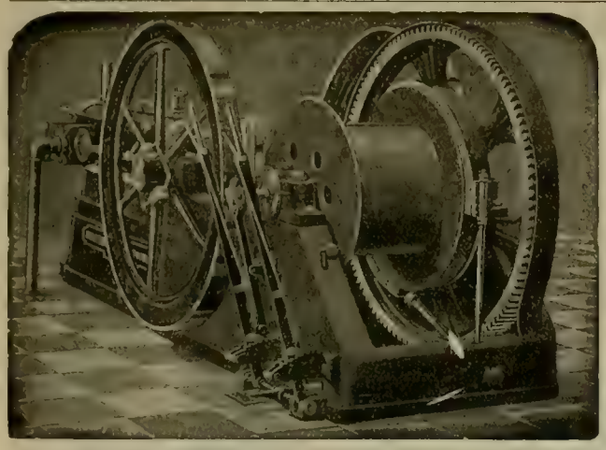


THE GRIFFIN
THREE ROLLER
ORE MILL.

The Griffin Three Roller Ore Mill is a simply constructed Mill, suitable for working all kinds of ores that require uniformly fine crushing by the wet process. This Mill is a modification of the well-known Chilian Mill, but the rollers run upon a crushing ring or die, which is inclined inwardly at an angle of about 30 degrees, the rollers themselves also being inclined to the central shaft of the Mill, thus utilizing the centrifugal force, as well as the weight of the rollers themselves as a crushing agent. The Griffin Three Roller Ore Mill is therefore a Mill of great strength, and has few wearing parts. We construct these Mills with extreme care, using only the best of raw materials, which are most carefully worked by men who are specialists as mill builders. We sell the Griffin Ore Mill on its determined merits, and will gladly supply full information regarding it to any one.

SEND FOR FREE ILLUSTRATED AND DESCRIPTIVE CATALOGUE TO

Bradley Pulverizer Co., Boston, Mass.



FAIRBANKS-MORSE GASOLINE-DISTILLATE GEARED HOISTER.

An efficient and reliable combination of a Fairbanks-Morse Gasoline-Distillate Engine on the same base with a Friction Hoist. Modern and up to date. We publish a special catalogue describing our Hoister which we gladly mail prospective purchasers.

FAIRBANKS-MORSE GASOLINE-DISTILLATE ENGINES.

ALL SIZES UP TO AND INCLUDING 54 HORSE POWER.
For Pumping, Milling, Lighting, Air Compressors, Etc.

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FAIRBANKS, MORSE & CO.,

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201 N. LOS ANGELES ST., LOS ANGELES, CAL.
FIRST AND STARK STS. PORTLAND, OGN.
1600 SEVENTEENTH ST., DENVER, COL.
FRANKLIN AND MONROE STS., CHICAGO, ILL.

Leschen Co.'s {Patent Aerial} {WIRE ROPE} TRAMWAY

FOR TRANSPORTATION OF ORE, COAL, DIRT, TIMBER, ETC.

Perfect Grip Clip,
Absolutely Safe,
Loads Automatically,
Unloads Automatically,
Operated by One Man,
Cost of Maintenance Low,
Capacity Largest Obtainable.

ALSO SOLE MANUFACTURERS
PATENT FLATTENED STRAND

[TRADE MARK REGISTERED.]
—AND—

Wire Rope
OF EVERY DESCRIPTION.

MANILLA, SISAL, BLOCKS, ETC.

A. LESCHEN & SONS ROPE CO.,

Home Office: 920-922 North Main St., ST. LOUIS, MO. Branch Offices: 92 CENTER ST. (Cor Leonard St.), NEW YORK. 47-49 SOUTH CANAL ST., CHICAGO, ILLS.

The Copper King, Limited.

Pacific Coast Smelting and Refining Works.

Works:
Seal Bluff Landing,
Cal.

Mines:
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Cal.

Purchasers, Samplers and Smelters
of
Gold, Silver and Copper Ores, and Furnace Products.

Offices:

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San Francisco, California.

Basildon House, 7-11 Moorgate St.,
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The "Stop for Repairs" to Mining Machinery,

Especially if it is a conveying plant, is a considerable item of expense. Many of these expensive pauses are made to repair or adjust faulty belting. To economize in this respect, use the

LEVIATHAN CONVEYOR BELT.

It is not only adapted to the heaviest service, but will run under any conditions in underground, drippings, extreme heat or cold.

IT WILL OUTLIVE ANY OTHER BELTING.

MAIN BELTING COMPANY,

1225-41 Carpenter Street, Philadelphia.
55-57 Market St., Chicago. 120 Pearl St., Boston.

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Small Portable Saw Mills and DRAG SAWING MACHINES FOR RANCHES AND MINES.

Woodworking Machinery.

LINK BELTING, SPROCKET WHEELS, ELEVATOR BUCKETS & BOOTS, TAKEUPS, FRICTION CLUTCH PULLEYS, ETC.

ALL STYLES AND SIZES IN STOCK FOR IMMEDIATE DELIVERY.

JNO. D. EBY,

17 & 19 MAIN STREET, - SAN FRANCISCO, CAL.

For handling Ore, Coal, Tailings and Dredgings. Catalogue mailed on application.

ROBINS CONVEYING BELT CO. Park Row Building, NEW YORK.

TELL US WHERE YOU'RE AT.

4 Cents Per Ton Per Mile

Is what it costs to transport Ore with our systems of Aerial Wire Rope Tramways.

We'd like to send you our book telling you all about it, but we can't do it unless you write us

WHERE YOU'RE AT.

THE J. H. MONTGOMERY MACHINERY CO.,
DENVER, COLO., U. S. A.

—WRITE FOR PRICE-LIST.—

FULDA'S PATENT SELF-TIGHTENING TANK.

Fulda's Planing Mills and Tank Manufactory,

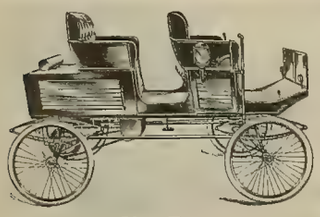
30-40 SPEAR STREET, SAN FRANCISCO, CAL.

—MANUFACTURERS OF—

RAILROAD, MINING, OIL, WATER, WINE, } TANKS.

Chemical and Cyanide Vats a Specialty.

WRITE FOR PRICE LIST.



No. 5.

The "Locomobile" Company OF THE PACIFIC.

STATIONS: { 1255 Market Street, San Francisco. 103 South Broadway, Los Angeles. 106 Telegraph Avenue, Oakland.

Your choice in nine different styles. Ladies can operate them. Sold in guaranteed condition at reasonable prices. Illustrated catalogues and information will be sent on application.

The Only **GRAND PRIX** (Highest Award)

Given at the PARIS EXPOSITION, 1900, to Builders of

Mining Machinery and Air Compressors

Was Awarded to this Company. In Addition to the GRAND PRIX,

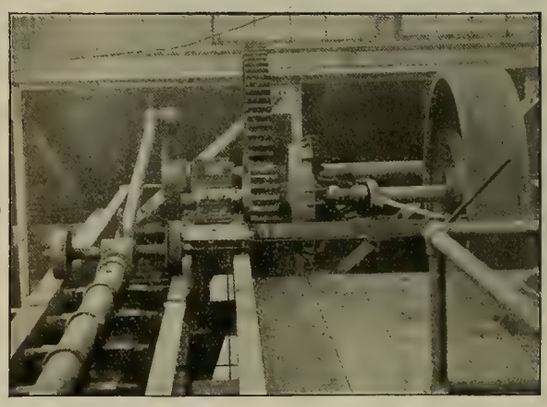
The GOLD MEDAL was also Awarded.

The **INGERSOLL-SERGEANT** Drill Company.

26 Cortlandt Street, New York.

RECIPROCATING CONVEYORS

FOR TRANSPORTING QUARTZ, TAILINGS, SAND, ETC.



FEEDING and MEASURING DEVICES.

PERFECT DISCHARGE ELEVATORS.

Complete Installations.

Heyl & Patterson, PITTSBURG.

IMPROVED GOLD DREDGES

OF THE SINGLE LIFT, CONTINUOUS BUCKET TYPE WITH

Working Capacity from 1500 to 5000 cubic yards per day,

AS DESIGNED AND MANUFACTURED BY

THE BUCYRUS COMPANY, South Milwaukee, Wis.

IMPROVED GOLD SAVING DEVICE of highest efficiency.

DREDGES CONSTRUCTED COMPLETE UNDER GUARANTEE OF TRIAL RUN.

FRANK W. GRIFFIN, Pacific Coast Agent,
Room 508, Safe Deposit Bldg., SAN FRANCISCO, CAL.

WRITE FOR DETAILED INFORMATION. TEL. MAIN 5499.

MACHINERY BARGAINS.

I have some splendid Air Compressors, Hoisting Engines, Rock Drills, Rock Crushers, Channeling Machines, Steam Pumps, Boilers, Steam Shovels, Locomotives and Relaying Rails, all in splendid condition. Send for printed list and specify your requirements. I can save you money. WILLIS SHAW, 627 New York Life Building, CHICAGO.

MINING HOISTS.

Engines, Boilers, Saw Mills, Hoe Saws, Mill Supplies.

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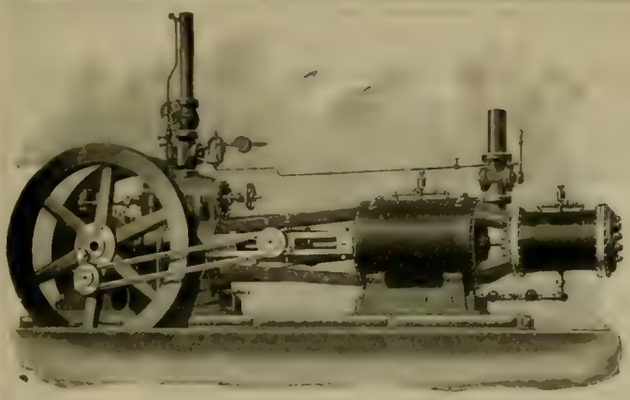

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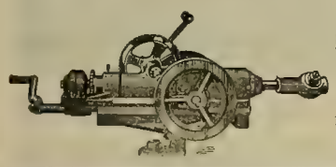

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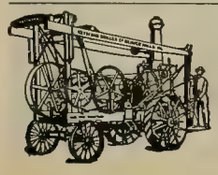

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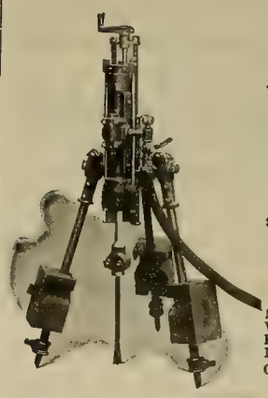

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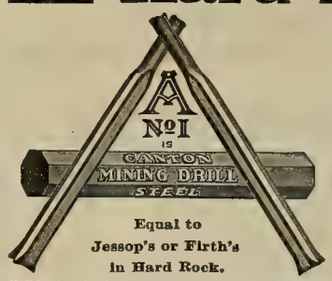

Equal to Jessop's or Firth's in Hard Rock.

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CRUSHING AND POWER PLANT.

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Used Less Than Three Months. Guaranteed in Splendid Condition.

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6 CHALLENGE AUTOMATIC ORE FEEDERS, including hoppers, wood frame, shafts and pulleys.
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2 AMALGAM SAFES.
1 BELT TIGHTENER, complete with pulley, boxes, etc., for main belt.
1 BELT TIGHTENER, complete with pulley, boxes, etc., for crusher.
1 CORLISS ENGINE, built by Fraser & Chalmers, cylinder 20″ diameter by 48″ stroke, complete in every particular, shaft 10″ in diameter, band flywheel 16′ diameter, 30″ face; weight, 42,000 pounds.
3 HORIZONTAL TUBULAR BOILERS, 54″ diameter, 16′ long, complete with steam drums 30″ x 72″, mud drums 18″ x 66″ for each boiler, breechings, smoke box, stack 48″ diameter 60′ long, all necessary guy rope, half arch fronts, grate bars, cast and wrought iron parts necessary for setting, feed, blow off check and safety valves, gauges and all fittings. Weight, 51,000 lbs. At present these boilers are arranged for setting in one battery. We will make any changes required, furnishing stacks and other items necessary to set each boiler separately.
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2 LOCOMOTIVES, 20″ gauge, built by H. K. Porter Co., Pittsburgh, one 6x10 cylinders, the other 8x14 cylinders, both saddle tank.

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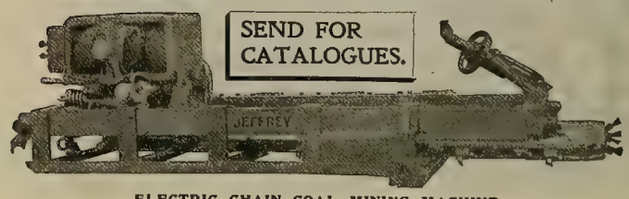

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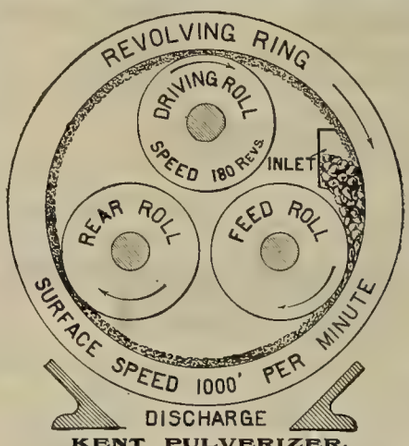

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FOR ORES, CEMENT and HARD SUBSTANCES.

Equals a 50-ton stamp mill. Grinds to any mesh under 8.
No slimes, no choking. Takes any fineness of feed under 1 in.
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Cost ¼ to 1-10 of any installation of same capacity.
Takes only one-half the horse power. Is automatic.

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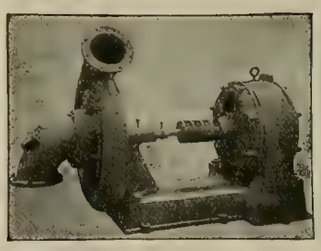

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WE DESIGN PUMPS FOR ALL CONDITIONS.
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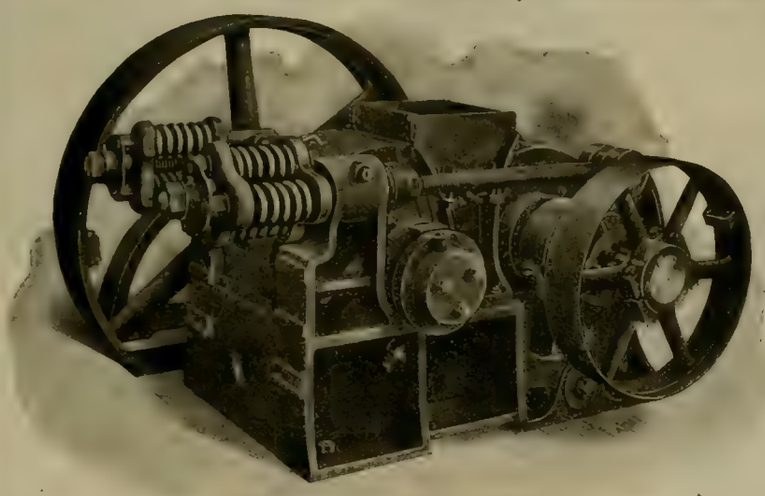

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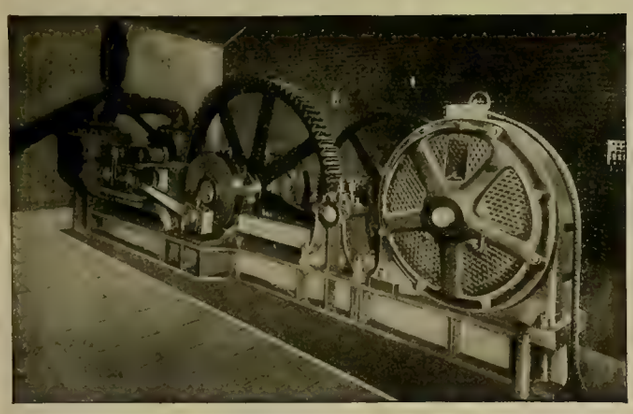

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Compact in Construction
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Universally adopted for the operation of mine machinery.

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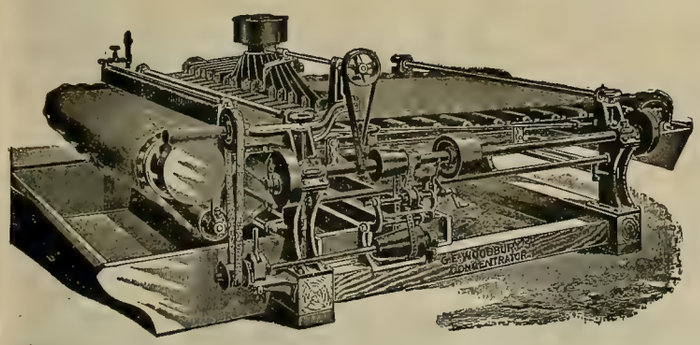
WOODBURY'S SIDE SHAKE CONCENTRATOR.



THIS Concentrator is superior to any other Belt Machine. It has an iron frame, steel shaking frame, and built in the most thorough manner. The patent distributing device distributes the pulp evenly over the whole working surface of the belt; thereby it enables the machine to perform perfect work, and giving more capacity to the Concentrator than any other Belt Machine. The variable eccentric crank gives the machine greater capability to work different classes of ore. I will warrant this machine as having more capacity than any other Concentrator.

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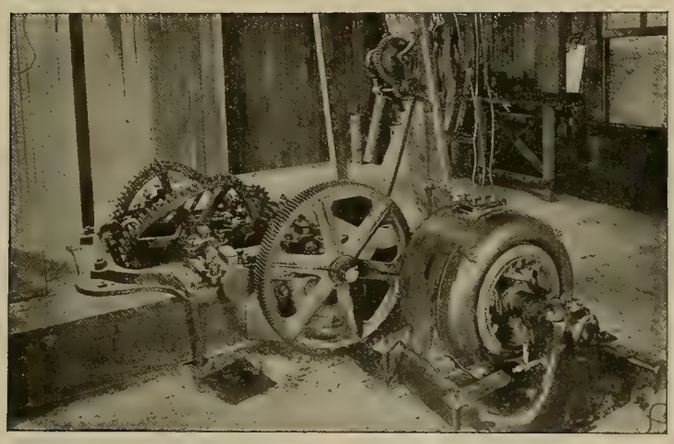
can be driven by any kind of Motive Power, but is usually sent from the factory fitted with a Friction Clutch Pulley to be driven by belt.



The above cut shows a No. 3 FULTON PUMP driven by Electric Motor direct connected.

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For Freighting and Logging.

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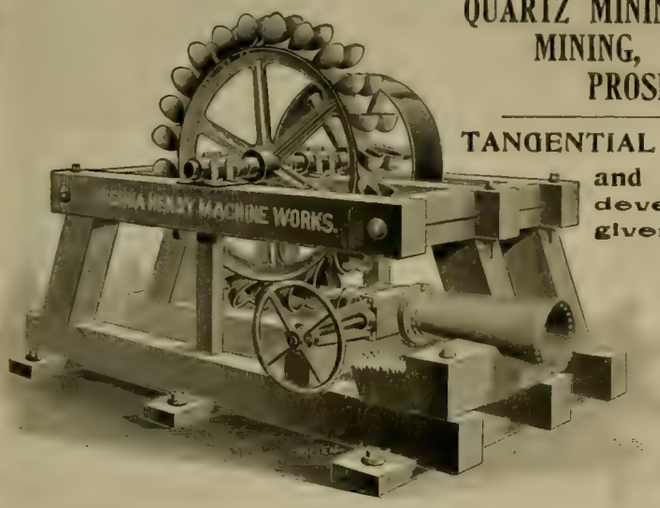

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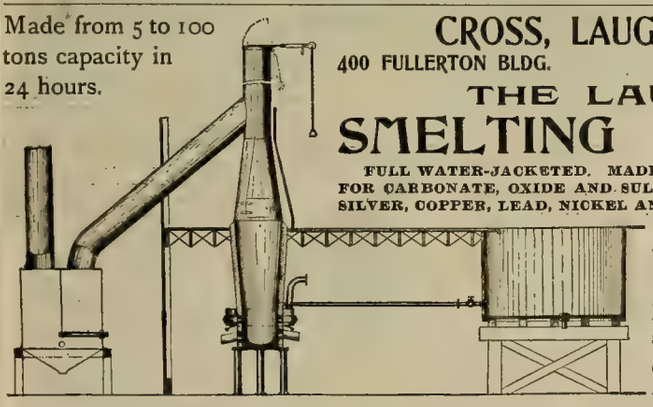

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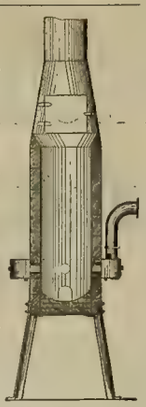

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CONCENTRATE AND AMALGAMATE

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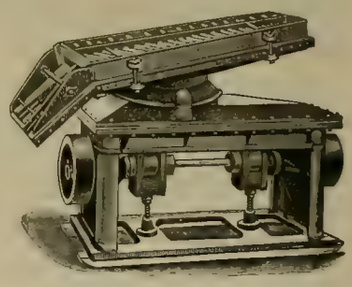

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Ores, etc., Treated:

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Lead,	Chrome,	Antimony,
Zinc,	Nickel,	Cinnabar,
Mica,	Clays,	Black Sands,
Tin,	Garnet,	Any Sands,
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SAMPLE LOTS TREATED FREE.

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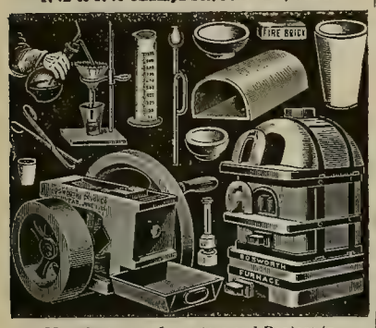

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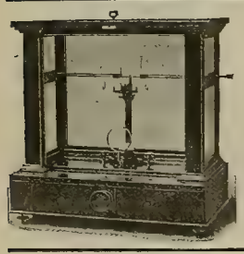

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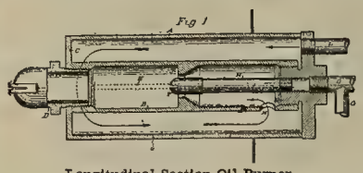

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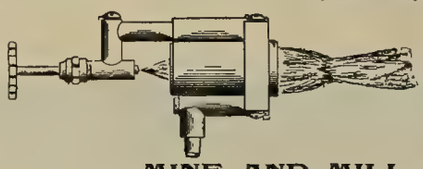

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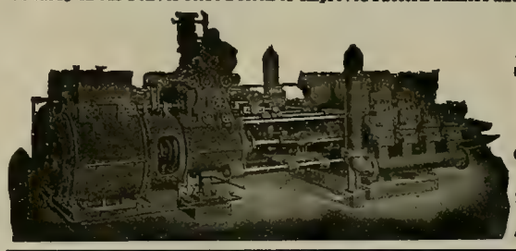

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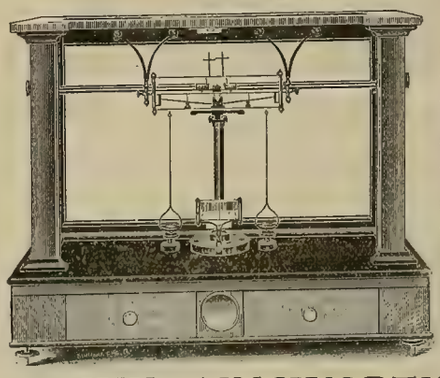

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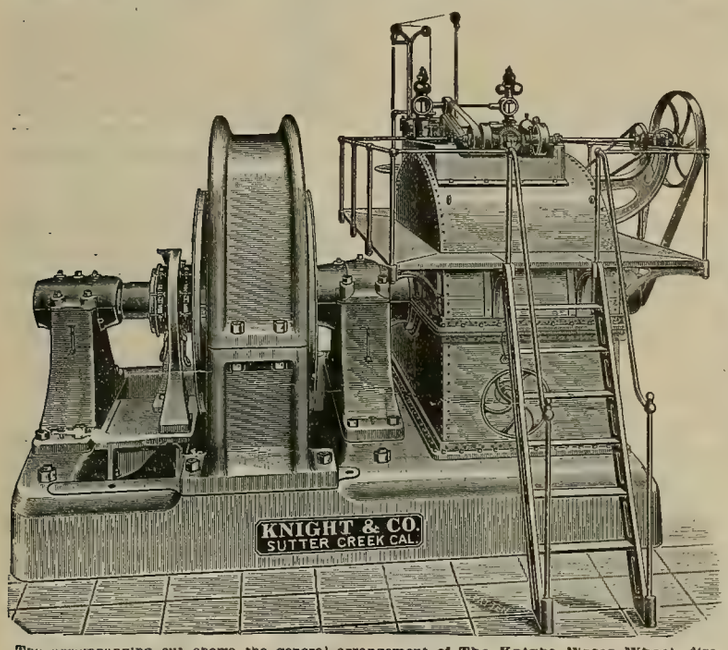

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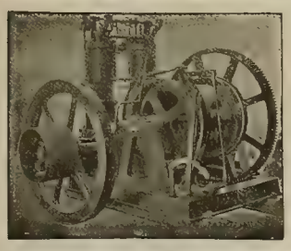

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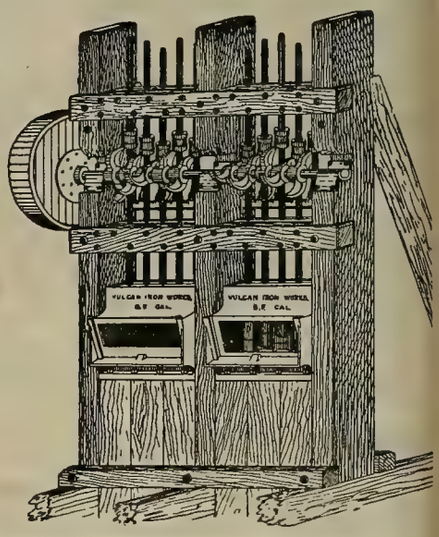

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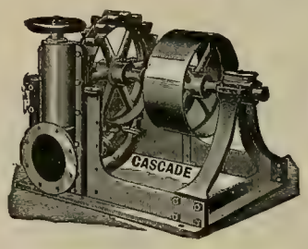

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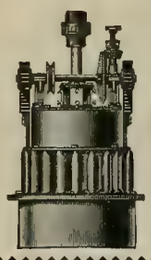

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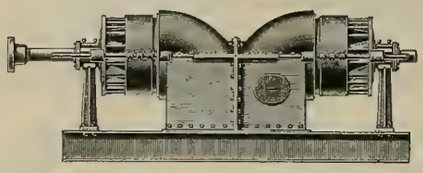

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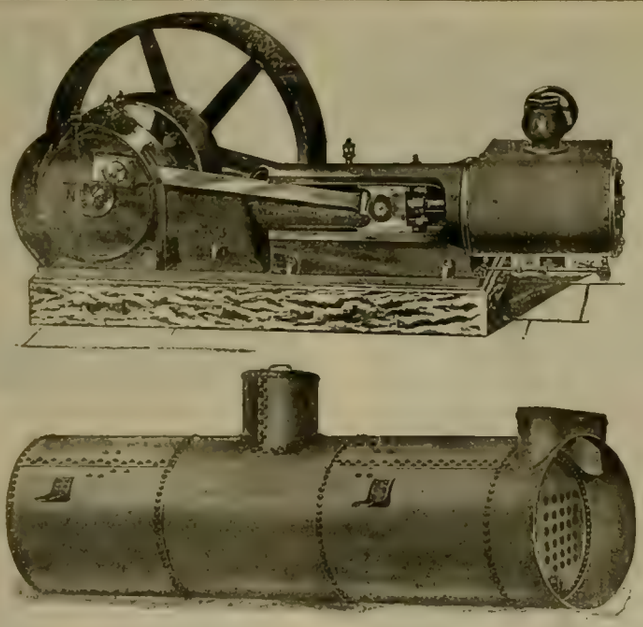

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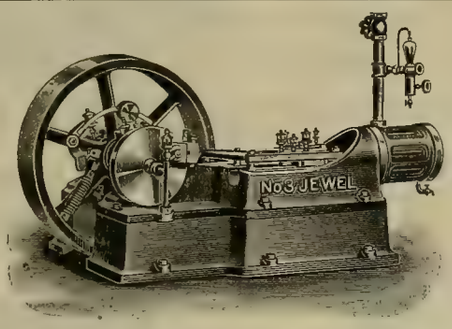

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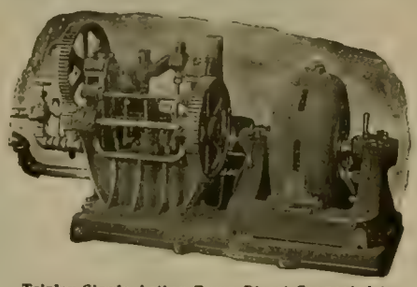

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may be run automatically, may be controlled from any point in the mine, and will give the highest efficiency independent of the level to which the water is to be raised.

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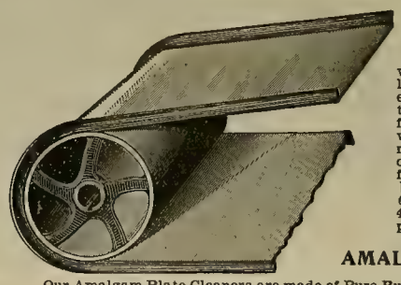

This illustration shows the edge flanging outwardly as it passes over the pulley. This relieves the strain from the top and bottom of the edge by directing the strain automatically to the inside face surface of the edges. Heretofore all belts have been so constructed that when they pass over the pulleys or rolls, a direct strain comes upon the top or at the base of of the edges, causing the edges to break away from the body of the belts in a very short time. *We avoid this Mechanical Defect by our Spadone Curved Edge.* Belts made to fit any machine—4, 5 and 6 feet wide. Prices and samples on application.

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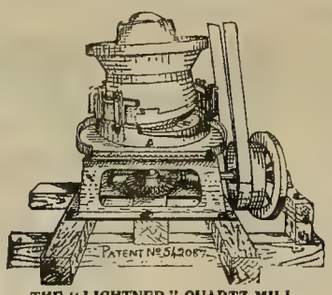

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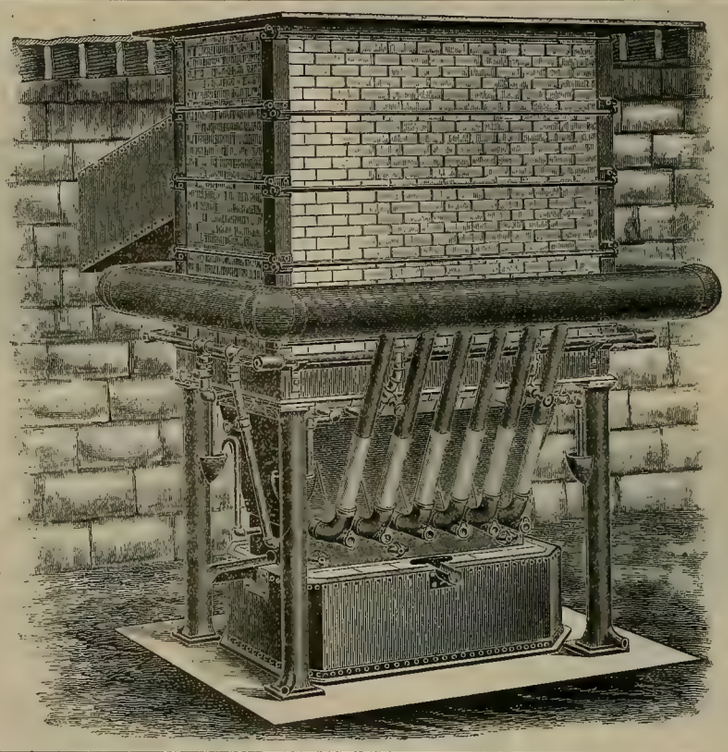

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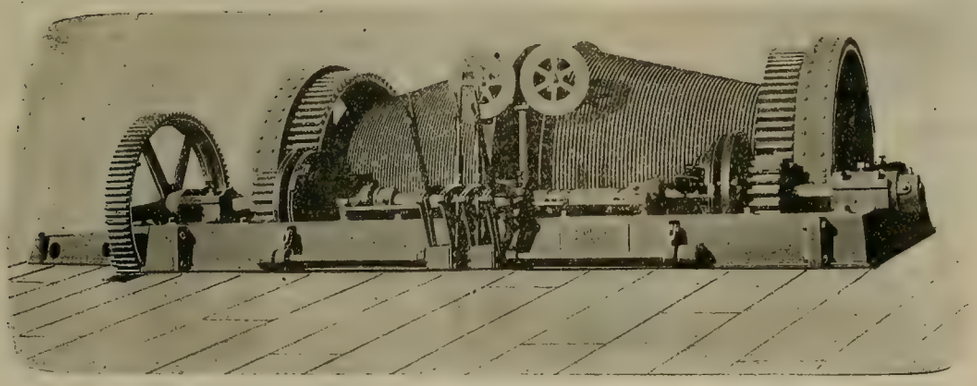

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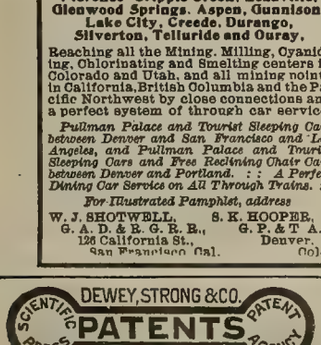

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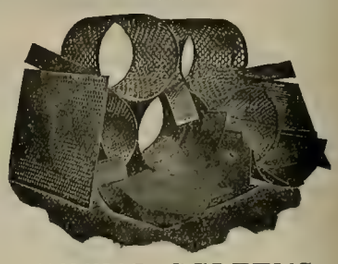

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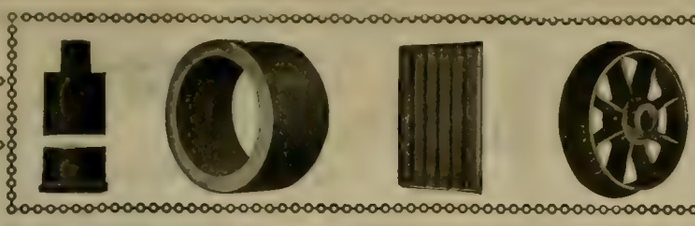
HARD  TOUGH

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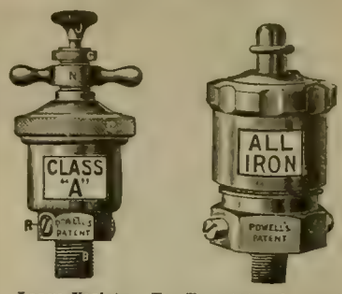

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Pipe	⅛ to 1 in.	¾ to 1½ in.	½ to 2½ in.
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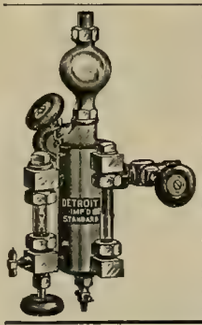

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ASSESSMENT NOTICES.

MARIPOSA COMMERCIAL AND MINING COMPANY.—Location of principal place of business, San Francisco, California; location of works, Mariposa County, California.

Notice is hereby given, that at a meeting of the Board of Directors, held on the 24th day of December, 1900, an assessment (No. 20) of Ten ($10) Dollars per share was levied upon the capital stock of the corporation, payable immediately in United States gold coin, to the secretary, at the office of the company, 320 Sansome street, room 24, San Francisco, California.

Any stock upon which this assessment shall remain unpaid on the 11th day of February, 1901, will be delinquent, and advertised for sale at public auction; and unless payment is made before, will be sold on SATURDAY, the 2nd day of March, 1901, to pay the delinquent assessment, together with the costs of advertising and expenses of sale.

By order of the Board of Directors.

JOSEPH H. MOOSER, Secretary.

Office—320 Sansome street, room 24, San Francisco, California.

TANANA MINING COMPANY.—Location of principal place of business, San Francisco, California.

Notice is hereby given, that at a meeting of the Board of Directors, held on the 20th day of December, A. D. 1900, an assessment (No. 2) of ten cents per share was levied upon the capital stock of the corporation, payable immediately in United States gold coin to the secretary, Edward H. Stearns, at his office, Room 801 Claus Spreckels Building, Cor. Third and Market Sts., San Francisco, California.

Any stock upon which this assessment shall remain unpaid on the 13th day of February, 1901, will be delinquent and advertised for sale at public auction; and unless payment is made before, will be sold on WEDNESDAY, the 6th day of March, 1901, to pay the delinquent assessment, together with the costs of advertising and expenses of sale.

By order of the Board of Directors.

EDWARD H. STEARNS, Secretary.

Office—Room 801 Claus Spreckels Building, Cor. Third and Market Sts., San Francisco, California.

YUBA RIVER GOLD DREDGING COMPANY.—Location of principal place of business, San Francisco, California; location of works, Smartsville, Yuba County, California.

Notice is hereby given, that at a meeting of the Board of Directors, held on the 4th day of January, 1901, an assessment (No. 2) of three cents (3 cents) per share was levied upon the capital stock of the corporation, payable immediately in United States gold coin, to the secretary, at the office of the company, No. 214 Pine street, Room 29, San Francisco, California.

Any stock upon which this assessment shall remain unpaid on the 9th day of February, 1901, will be delinquent, and advertised for sale at public auction; and unless payment is made before, will be sold on TUESDAY, the 5th day of March, 1901, to pay the delinquent assessment, together with the costs of advertising and expenses of sale.

By order of the Board of Directors.

ALBERT CERF, Secretary.

Office—No. 214 Pine street, Room 29, San Francisco, California.

LARKIN MINING COMPANY.—Location of principal place of business, San Francisco, California; location of works, El Dorado County, California.

Notice is hereby given, that at a meeting of the Board of Directors, held on the 18th day of January, 1901, an assessment (No. 9) of two (2) cents per share was levied upon the capital stock of the corporation, payable immediately in United States gold coin, to the secretary, at the office of the company, 112 Main street, San Francisco, California.

Any stock upon which this assessment shall remain unpaid on the 25th day of February, 1901, will be delinquent and advertised for sale at public auction; and unless payment is made before, will be sold on MONDAY, the 18th day of March, 1901, to pay the delinquent assessment, together with the costs of advertising and expenses of sale.

By order of the Board of Directors.

N. F. REMINGTON, Secretary.

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THE CALIFORNIA DEBRIS COMMISSION HAVING received applications to mine by the hydraulic process from Peter H. Russell, in the Dad's Gulch Mine, near Camptonville, Yuba Co., to deposit tailings in Brandy Creek; from Wm. Abbott and Louis W. Clark, in the Gold Hill Placer Mine, near Rackerby, Yuba Co., to deposit tailings in a ravine below the mine; and from E. C. and P. J. Rigney, in the Maxey Mine near Mountain Ranch, Calaveras Co., to deposit tailings in O'Neil's Creek, gives notice that a meeting will be held at Room 59, Flood Building, San Francisco, Cal., on February 11, 1901, at 1:30 P. M.

DELINQUENT SALE NOTICE.

AMERICAN OIL AND REFINERY COMPANY.—Location of principal place of business, San Francisco, California. Location of works, Contra Costa County, California.

NOTICE.—There are delinquent upon the following described stock, on account of assessment (No. 2) levied on the 26th day of November, 1900 the several amounts set opposite the names of the respective shareholders, as follows:

Names.	No. Cert.	No. Shares.	Amt.
Abbott, William	720	50	$2 50
Abbott, William	721	50	2 50
Abbott, William	722	50	2 50
Abbott, William	723	25	1 25
Abbott, William	734	25	1 25
Anthony, J. C., Trustee	797	1,000	50 00
Anthony, J. C., Trustee	798	1,000	50 00
Anthony, J. C., Trustee	799	1,000	50 00
Anthony, J. C., Trustee	973	1,000	50 00
Anthony, J. C., Trustee	1021	4 300	215 00
Dignan, J. P.	1039	1,000	50 00
French, Mrs. Mary L.	385	2	10
Goodenough, S.	1046	380	19 00
Holbrook, W. E., Trustee	897	10 000	500 00
Holbrook, W. E., Trustee	898	11,000	550 00
Holbrook, W. E., Trustee	899	4 500	225 00
Holbrook, W. E., Trustee	900	4,500	225 00
Kielhofer, Mrs. Louis	298	2	10
Kraehmer, Louis L.	471	3	15
Laird, Mrs. L. N.	230	5	25
Lord, Mrs. Leona E.	327	2,000	100 00
Lucas, Mrs. T. R.	848	10	50
Mayer, Mrs. L.	406	800	40 00
Massey, James B.	914	1	05
McKevey, Mrs. Angel'na	71	12	60
McAllister, H. L.	1071	100	5 00
Pope, Wm.	656	50	2 50
Pope, Wm.	695	20	1 00
Pope, Wm.	764	30	1 50
Pope, Wm.	908	20	1 00
Raht, Julia F.	321	25	1 25
Raht, Julia F.	453	40	2 00
Rachel, Mrs. Eliza	856	400	20 00
Royce, Lizzie A.	441	5	25
Russell, G. E.	125	3	15
Stover, W. M.	1047	480	24 00
Truitt, J. J.	399	5	25
Walser, Mark	858	1,000	50 00
Walser, Mark	859	1,000	50 00
Walser, Mark	860	1,000	50 00
Walser, Mark	861	1,000	50 00
Walser, Mark	863	500	25 00
Walser, Mark	867	500	25 00
Walser, Mark	868	500	25 00
Walser, Mark	869	500	25 00
Walser, Mark	870	500	25 00
Walser, Mark	871	500	25 00
Walser, Mark	872	500	25 00
Walser, Mark	921	50	2 50
Walser, Mark	926	5,000	250 00
Walser, Mark	927	5,000	250 00
Walser, Mark, Trustee	596	500	25 00
Walker, Mrs. S. E. D. E.	375	120	6 00
Young, R.	761	328	16 40

And in accordance with law, and an order from the Board of Directors, made on the 26th day of November, 1900, so many shares of each parcel of such stock as may be necessary, will be sold at public auction at the office of said corporation, in Rooms 322-323 Parrott building, San Francisco, California, on MONDAY, the 28th day of January, 1901, at the hour of 1 o'clock P. M. of said day, to pay said delinquent assessment thereon, together with costs of advertising and expenses of sale.

J. C. ANTHONY, Secretary.

Office—Rooms 322-323, Parrott building, San Francisco, California.

POSTPONEMENT.

By order of the Board of Directors, the day of sale of the above delinquent stock has been postponed to MONDAY, the 11th day of February, 1901, at the hour of 1 o clock P. M., at the office of said corporation in Rooms 322-323 Parrott building, San Francisco, California. J. C. ANTHONY, Secretary.

DELINQUENT SALE NOTICE.

SILVER KING MINING COMPANY.—Location of principal place of business, San Francisco, California; location of works Pioneer Mining District, Pinal County, Arizona Territory.

Notice.—There are delinquent upon the following described stock, on account of assessment (No. 22) levied on the 13th day of December, 1900, the several amounts set opposite the names of the respective shareholders, as follows:

Names.	No. Cert.	No. Shares.	Amt.
Geo. C. Hickox	7285	5	$1 25
F. A. Berlin	7286	5	1 25
Paul A. Ryman	7338	100	25 00
Paul A. Ryman	7339	100	25 00
John Turnbull, Trustee	7357	100	25 00
John Turnbull, Trustee	7358	50	12 50
J. W. Pew, Trustee	7375	100	25 00
J. W. Pew, Trustee	7376	100	25 00
J. W. Pew, Trustee	7377	100	25 00
J. W. Pew, Trustee	7378	100	25 00
J. W. Pew, Trustee	7379	100	25 00
John W. Pew	7395	5	1 25
F. Avery	7396	5	1 25

And in accordance with law, and an order from the Board of Directors, made on the 13th day of December, 1900, so many shares of each parcel of such stock as may be necessary, will be sold at public auction at the office of the company, No. 310 Pine street, room 36, San Francisco, California, on TUESDAY, the 19th day of February, 1901, at the hour of 1 o'clock P. M. of said day, to pay said delinquent assessment thereon, together with costs of advertising and expenses of sale.

J. W. PEW, Secretary.

Office—310 Pine street, room 36, San Francisco, California.

DELINQUENT SALE NOTICE.

MAY DAY GOLD & SILVER MINING COMPANY.—Location of principal place of business, San Francisco, California; location of works, Calaveras County, California.

Notice.—There are delinquent upon the following described stock, on account of assessment (No. 5) levied on the 30th day of November, 1900, the several amounts set opposite the names of the respective shareholders, as follows:

Names.	No. Cert.	No. Shares.	Amt.
William H. Chapman	42	100	$5 00
Thos. A. DeLay	48	600	30 00
Thos. A. DeLay, Trustee	88	6 000	300 00
Thos. A. DeLay, Trustee	90	5,000	250 00

And in accordance with law, and an order from the Board of Directors, made on the 30th day of November, 1900, so many shares of each parcel of such stock as may be necessary, will be sold at public auction, at the office of the company, at Heald's Business College, No. 24 Post street, San Francisco, California, on TUESDAY, the 19th day of February, 1901, at the hour of 1 o'clock P. M. of said day, to pay said delinquent assessment thereon, together with costs of advertising and expenses of sale.

EDWARD H. STEARNS, Secretary.

Office of Company—Heald's Business College, 24 Post St., San Francisco, California.

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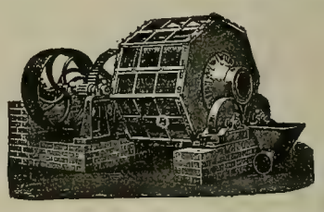

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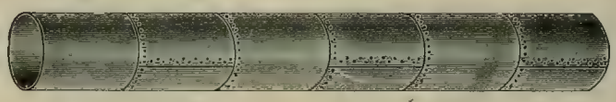

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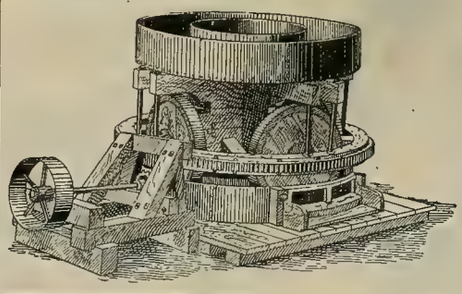

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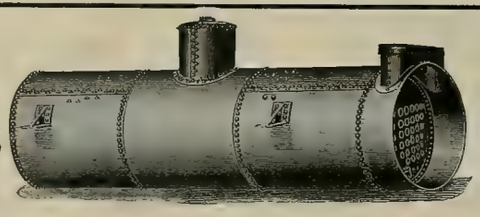

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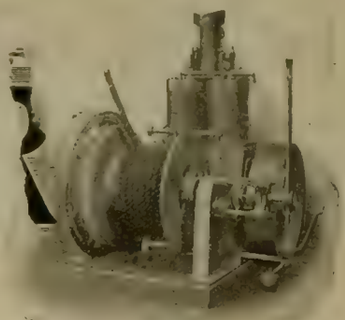

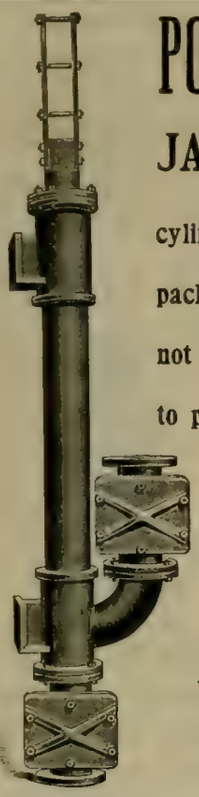

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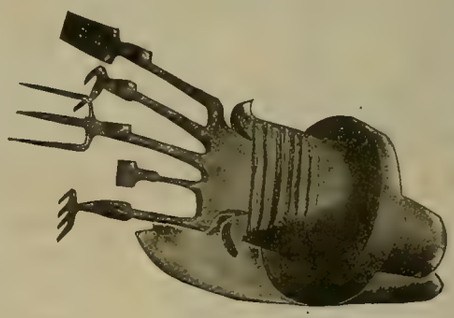

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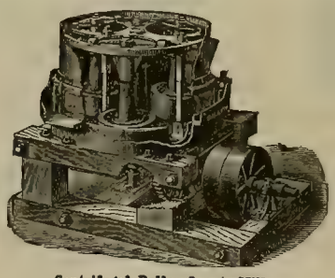

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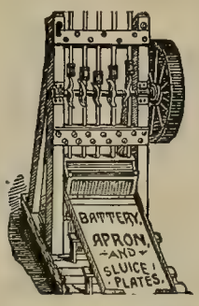

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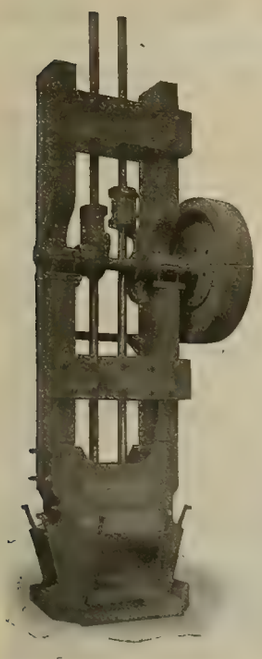

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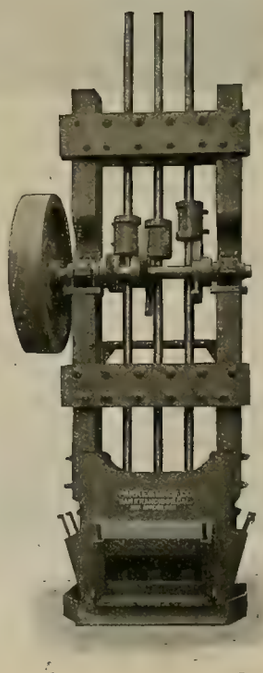

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MINING AND SCIENTIFIC PRESS.

Whole No. 2116.—VOLUME LXXXII. Number 6. SAN FRANCISCO, SATURDAY, FEBRUARY 9, 1901. THREE DOLLARS PER ANNUM. Single Copies, Ten Cents.

A Small Stamp Mill.

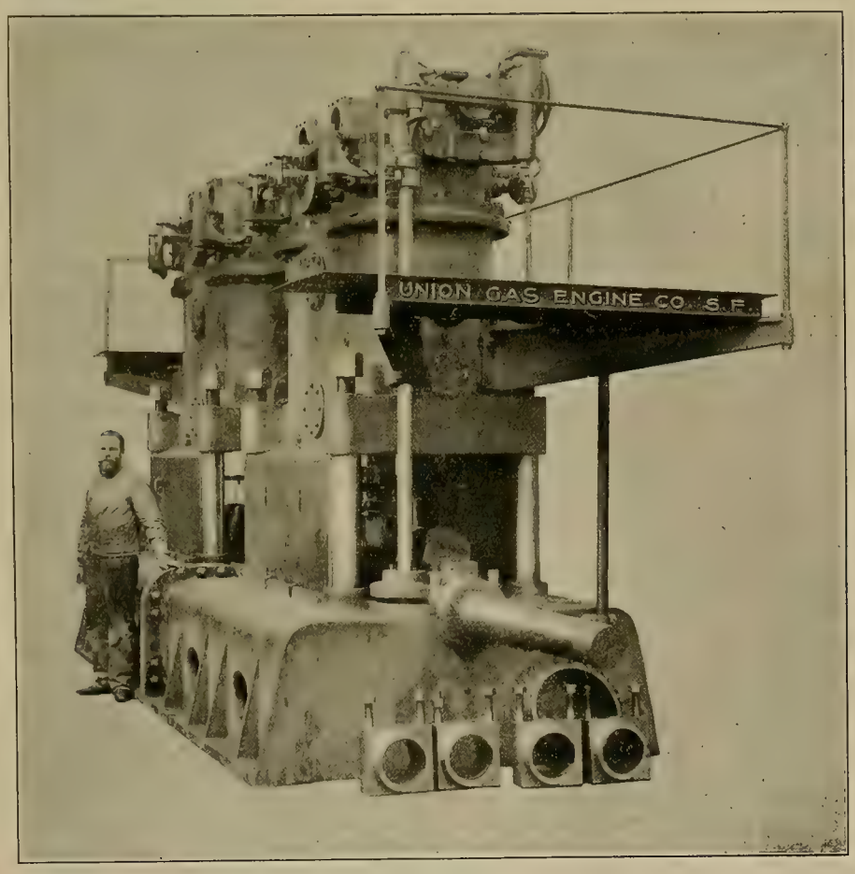
Representation is here given of the recently constructed mill of the Magnet Mining & Milling Co., near Gold, Madera Co., Cal., as a type of the many small mills, capable of enlargement, which are now going up throughout the mining districts of California. The stamps, of 850 pounds weight each, are run with a speed of 110 to 115 drops per minute. The mill is provided with a conccentrator and other modern gold-saving appliances. The power at present used is steam; water power is available for six months in the year, and will be utilized as soon as the necessary dam can be built. Hitherto the ore has been extracted from workings about 500 feet distant from the mill, transportation being effected by means of an automatic tramway, shown in the illustration. The ore so far taken out and milled has given satisfactory returns to the owners; and to facilitate extraction, as well as to drain the surface water from the mine, a main working tunnel is being driven along the footwall of the vein on a level with the ore bin of the mill, giving a depth of 200 feet on the ore chute in the upper workings.

In the same vicinity are the Mud Springs, Waterloo and Five Oaks mines, all producing and of the class of mining properties that are feeders to the general mining prosperity of the State, tending to develop into large properties and creating a cash demand for supplies of all kinds.

Mill of the Magnet Mine, Madera Co., Cal.

Largest Gas Engine Yet Made on the Pacific Coast.

On this page is illustrated the largest gas engine ever manufactured on this side of the continent. This was built by the Union Gas Engine Co., 240–246 First St., San Francisco, Cal. The estimated power is from 350 to 360 brake horse power. It was built for the San Francisco Gas & Electric Co., and is intended to drive, through direct connection, a 200 kilowatt generator. The approximate weight of engine is fifty tons; length over all, 29½ feet; width, 8 feet 2 inches; height, 12 feet 9 inches. This engine is of the four-cylinder type and is so arranged that one or more cylinders can be "cut out" even while engine is in operation. A self-starting device is connected to each cylinder. The manufacturers say that this engine is guaranteed to regulate within 2½%. The Union Gas Engine Co. expects soon to build engines of 500 H. P. each, which shows that, here on the Pacific coast, power users are realizing that the gas engine is rapidly coming to the front as a motive power.



360 H. P. "Union" Gas Engine.

STEAM TURBINES is the subject of special discussion by those interested in steam engineering, the principle being now thoroughly established that a jet of steam issuing through a properly constructed orifice has as much energy as the same steam performing ratios of expansion behind a piston. The steam turbine is constructed to utilize the maximum energy of the steam. Some experiences detailed by F. Hodgkinson in connection with an experimental plant built by the Westinghouse Air Brake Co. are of special interest. A steam turbine plant was put in and run for about nine months, then shut down, and the steam engines which had previously done the same work were reconnected, and, after a time trial test, the turbine plant again put into operation, with a stated average saving in coal of 35.7% during the day and 36.4% during the night in favor of the turbines. The saving in feed water is also stated to have been 29.8% during the day and 41.4% during the night. The advantages of electric transmission and the absence of long steam pipe condensation aided in the economical showing in favor of the turbines. The application of the steam turbine is so far somewhat limited, being deemed particularly applicable to driving electrical machinery. The most prominent form of direct application has been to marine propulsion. In the vessel, the Turbina, built by Mr. Parsons, a speed of nearly 39 miles per hour has been attained.

THE newest thing in power development is the effort to construct large double-acting gas engines along the same lines as steam engines, work to be done on the piston at each stroke. M. Koerting of Germany has built a 350 H. P. gas engine on the same general plan as a steam engine, and a test with power gas, at full load, lasting one hour, is reported to have converted 38% of heat into indicated work. With even 25%, the idea would be a practical success. The Koerting gas engine is a 2-cycle, double-acting motor; no mixing pump for the gas and air, each having its own pump, each of these having piston valves worked from an eccentric on the crank shaft, delivering air and gas respectively through two separate pipes into openings in front of the admission valve, at either end of the cylinder. The cooling water for the piston and piston rod is carried through sliding telescopic tubes moving to and fro with the crosshead on angled joint between them, with a rotating stuffing-box. The latter and the double-acting piston constitute two interesting factors in the proposition. The trials made of the advanced construction warrant the builder in carrying on further experiments

MINING AND SCIENTIFIC PRESS.

ESTABLISHED 1860.

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W. D. CURTIS.....223 W. Second St., Los Angeles, Cal.

San Francisco, February 9, 1901.

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SEVERAL State legislatures are in session and some of those not engaged in the protracted work of electing U. S. Senators are endeavoring to enact additional mining legislation. Apart from the usual "cinch" bills, redolent of "graft," and almost avowedly introduced as a source of illicit individual revenue, are some apparently actuated by honest desire to do some good, but not what the mining industry wants. As a general thing, all that the mine operator asks of a legislature is that he be let alone. State legislation, however well-intentioned, usually hurts and hinders more than it helps, for a corrupt legislator, like the bull in the china shop, soils all he omits to shiver. Colorado, Idaho and Oregon seem to want increased taxation on mining properties, though earnest protests on the part of mine owners in those three States may defeat the proposed laws. In Idaho the Governor makes the ridiculous proposition that all producing properties be taxed. His suggestion might well be entitled "An Act to throttle the development of the mining industry of Idaho." Colorado has had more experience in such mistaken legislation and will probably note the protests from Teller county and other sections of the State. The California legislature has so far shown good judgment in its attitude toward proposed mining measures. Some of the mining "laws" introduced at the present session are so plainly cinch bills that they deserve the scant courtesy accorded them. Senate bill No. 106, in the California legislature, is honestly intended to be of benefit, but deserves defeat. Such a law was passed in 1897, repealed in 1899 and re-repealed in 1900. In addition, the bill mentioned conflicts with the U. S. Statutes, and, if passed, after considerable annoyance and expense, would be so declared. Senate bill 378, "fixing and defining a miner's inch," is a good one and deserves unanimous passage. Assembly bill 143, "providing for the inspection of illuminating oils," etc., should be rightly called "An Act to check the oil development of California." It is very "raw," and beneath contempt or ridicule. Montana and Nevada legislatures have just passed acts making eight hours a day's work in all mines, mills and smelting establishments in those States. Such legislation is generally held to be constitutional, where the law is of general application, but it is not vouchsafed a legislature to pass any law regulating wages in any way.

THE merging of the American Smelting & Refining Co. and the Guggenheim interests in the new organization of the American Smelting Co. brings a statement from the Guggenheims that they can "work out bigger problems to better advantage doubly than singly." They say that they "have kept up the price of lead, and propose to do the same with silver," and hope in time "to handle silver as intelligently as they have jointly treated lead." The assertion is made that silver is now "scientifically and secretly bought by four brokers in London who stand in with each other and the buyer." This they propose to change.

Development of the Mineral Industry.

Deserved prominence is given by the Government Bureau of Statistics to an official statement showing that mineral products, crude and manufactured, have become in recent years a great feature of the domestic exports of the United States. Of the $1,565,228,606 exports of domestic products, including gold and silver, in the year 1900, $436,227,477 in value were composed of mineral products, showing that 28% of the total domestic exports originated beneath the surface of the earth. Much of their selling value was, of course, added by the labor which turned them into form required for use. The exports of iron and steel, for instance, amounted in 1900 to $130,000,000; mineral oils of all classes, $75,000,000; copper, nearly $60,000,000; coal and coke, $22,000,000; paraffine, $8,000,000; phosphates, $5,000,000. The gold production exported amounted to $52,787,523, the silver to $59,272,668.

Of exports of minerals, metals and manufactures thereof, exclusive of gold and silver, the total for 1890 was $103,693,955; in 1900, $324,167,286, more than three times as much as ten years before. Of gold, the domestic product exported in 1890 amounted to $20,654,960; in 1900, to $52,787,523. Of silver, the exports of 1890 were $16,098,180; of 1900, $59,272,668. The value of metals, minerals and the products thereof exported in 1900, exclusive of gold and silver, showed an increase of 218% over 1890, and including gold and silver, an increase of 210%. The total domestic exports, excluding gold and silver, showed during the same time an increase of only 77%.

At the same time imports of mineral character have materially decreased, except in case of natural products not obtained from the mines of the United States, but required for use in manufacturing. Imports of manufactures of iron and steel, for instance, fell from $41,679,501 in 1890 to $20,443,908 in 1900, while pig tin used in the manufacture of tinplate has increased from about $6,500,000 in 1890 to $19,458,586 in 1900.

The following table, compiled by the Treasury Bureau of Statistics, showing the exportations in 1890 and 1900 of the principal products of minerals, metals and the more important manufactures thereof, illustrates the great development during the decade of the great basic industry of the nation:

	CALENDAR YEAR 1890.	CALENDAR YEAR 1900.
Iron and steel and manufactures.$	27,000,134	$129,788,236
Mineral oil	52,270,943	74,493,707
Copper and manufactures	5,918,395	58,861,529
Coal and coke	7,277,692	22,883,047
Paraffine	2,920,262	8,185,518
Scientific instruments	1,500,369	6,788,938
Phosphates	1,818,439	5,217,560
Cycles	.....	3,060,161
Zinc and manufactures	344,991	2,316,981
Clocks and watches	1,591,836	2,104,319
Brass and manufactures	.....	2,068,072
Copper sulphate	.....	2,050,989
Jewelry and plated ware	1,225,077	1,810,480
Marble and stone manufactures	948,321	1,556,981
Nickel	.....	1,382,727
Tin	262,343	467,332
Lead and manufactures	521,961	459,571
Quicksilver	93,192	425,812
Cement	.....	225,306
Total domestic merchandise.$	103,693,955	$324,167,266
Domestic gold exported	20,654,960	52,787,523
Domestic silver exported	16,098,189	59,272,663
Total minerals, metals and manufactures	$140,447,104	$436,227,457

SOME deserved praise is being accorded the U. S. Corps of Engineers, which furnishes a high quality of service for the Government at less than commensurate value. The Corps of U. S. Engineers controls and directs a larger amount of money than any other Government bureau. It also has a larger number of employes, there being in the aggregate over 11,000 employes, though of that number less than 350 are engineers.

Federal Mining Law Amendments.

Senator Stewart of Nevada is trying to push a bill through Congress amending the U. S. mining laws. The bill provides, among other things:

That no person shall locate a mining claim as agent or by power of attorney for another, except as hereinafter provided. No person shall locate more than one placer mining claim in the watershed of any stream or creek in the same mining district, nor shall any person locate more than one claim on any vein or lode; provided, that any citizen of the United States or person who shall have declared his intention to become such may, after the discovery of ore in place in a lode or mineral vein in paying quantities in a placer deposit, locate one such claim for one other person as agent or attorney and no more in any one mining district; provided, further, that prior to any such location for another, he shall file for record in the recorder's office of the mining district a power of attorney authorizing him to make mining locations for the person named therein.

By reason of the fact that Stewart of Nevada was the author of the Federal Mining law of 1872, he has constantly arrogated to himself the adjustment of all matters in connection therewith, in which he has been sustained by what is known as "senatorial courtesy," which in this case means that miners are not supposed to know what they want, and that Stewart does know. Unfortunately, if he does, he refrains from evidence of such knowledge. He has steadily defeated every effort to get adequate and necessary amendment to the Federal Mining law.

Section 1 of his present proposed bill is open to serious objection. It means additional opportunity for extensive and expensive litigation such as now goes on under the ridiculous extralateral law. It is a menace to the miner, and should be beaten in the committee room. Were it to become a law a locator could be harassed even more than at present. A locator might locate claims one, two or three miles apart and, in case of developed value, the plea set up that they were on the same vein or lode.

Senator Stewart might even at this late day undo some of the mischief he has made by favoring necessary amendment to the Federal Mining law; and, if conscious of his own inability in that direction, he might graciously exercise his "senatorial courtesy" to the extent of letting some one else in Congress introduce so requisite a measure. It is possible that, out of 90 Senators and 357 Representatives, some one might be found sufficiently competent to draft and advocate such a bill.

If a bill were passed in the U. S. Congress repealing the "apex" and "extralateral" features of mining locations, making their limits vertical side and end lines, making all locations conform to legal subdivisions of U. S. surveys, obliging locators to complete $500 worth of improvements and make application for patent within five years from date of location, and an amendment not allowing relocating of claims to avoid annual assessment work, there would be some resultant good to the real miner. The suggested amendments have long been advocated by legitimate mining interests.

THOS. LAWSON of Boston, the organizer and promoter of the Trinity Copper Co., of Shasta county, Cal., is quoted in Boston as saying: "No investment in gold or silver mining stock, the stock of a land company or an industrial based upon patents, is attended with so great a risk as an investment in the stock of a new copper mine. At least 499 in each 500 of the new copper mines whose stocks are offered for sale publicly are worthless, a large proportion of them being swindles of a most flagrant character, organized and conducted for the sole purpose of selling stock." This is strong language and not warranted by the facts. It might, perhaps, have been more conservative to have said 489, or even 479.

THE Secretary of the Interior has reversed a recent ruling of the General Land Office Commissioner concerning location of claims across claims previously patented. The latter had refused patent to a Gilpin county, Colo., company on the ground that part of their location lines were laid within or upon other patented lode claims. The Secretary holds that extralateral rights are ofttimes the most valuable rights obtained in a lode location; that exterior lines of a location are not in themselves property, but mere boundaries or instruments of description, and that the junior locator has the right, where necessary, to place end lines on other patented claims

Concentrates.

WITH acid ore lime has proved beneficial in gold mills.

LIQUID AIR has not been, nor is it likely to be, used in gold extraction.

THE chief restriction on the bromine recovery gold process is its cost.

COPPER taken up by ammonia solution can be most readily precipitated by iron.

A FEW DROPS of coal oil on the hands up to the wrists will greatly obviate the numbing effect of cold.

IN ditches and flumes in hydraulic mining the average loss by leakage is about 8% and by evaporation about 9%.

"ROCK IN PLACE" is any rock, mineralized or unmineralized, in the solid mass of the mountain, other than float.

METALS have no smell when entirely clean and untouched by the hands. Metals acquire no smell by being warmed.

PLATINIC CHLORIDE may be made by dissolving spongy or scrap platinum in aqua regia and evaporating to dryness by a gentle heat.

IF rigidly accurate in statement, there is no such thing as "wireless" telegraphy, as in the Marconi, Tesla and similar systems wire is used.

THE only American standard legally recognized by congressional action is the troy pound of the United States Mint, legalized in 1827.

TO PROPEL A BOAT 25 feet long, 5 feet beam, drawing 19 inches, 4 miles an hour, slack water, would require 4½ H. P. A knot equals 1.15 miles.

PLATINUM has the highest melting point of any metal used in electrical work, and with equal sized wires would carry the heaviest current without melting.

AN engine with a piston 14 inches in diameter, stroke 28 inches, speed 100 revolutions per minute, mean effective pressure 35 pounds, is developing 75 H. P.

QUICKSILVER as a chloride is rare. It is reported found in minute quantity at Idria, Austria, and Almaden, Spain, in connection with the sulphide. It is considered as a curiosity.

MINING MEN who are "moving around" can have the address of their paper changed at any time for any interval by notifying the business office of the present and intended address.

ACCORDING to the American system of standard weights a carat is 205 milligrammes, or three and two-thirteenth grains. A troy ounce would be 31,103 milligrammes, or 151.72 carats.

WHILE gold mining is the only business on earth in which there is no competition, the statement does not apply to the sale of mining shares in which there is at times considerable competition.

THE California State Mining Bureau is not an advertising medium but an educational institution, and has done some good work in that direction. It could do more if politics was kept out of it.

IN connection with the page article, "New Methods for the Extraction of Copper and Zinc," in the issue of Dec. 29, 1900, the address of the G. C. Collins referred to is 39 Broad street, New York City.

THE cost of producing an ounce of gold or silver in paying mines has nothing to do with the actual value of the product, which latter, in this respect, differs from any other branch of human industry.

IN the issue of the 26th ult. it was erroneously stated that "the deepest shaft in Victoria, Australia, is at Stawell, 2409 feet." The deepest shaft in that country is at Bendigo, Lawsell's 180 Mine, 3452 feet.

ONE cubic yard of hard rock will make 1.7 cubic yards embankment; one cubic yard embankment will require about .5882 cubic yard rock in place. One solid cubic yard rock in place will make 1.8 cubic yard when piled.

"AN OUNCE OF GOLD" is not definite in value. The latter depends upon the fineness of the gold; the ounce may be $10 or $20, according to its fineness. Where reported in "ounces fine," pure gold, it is worth $20.67 per ounce.

TO OXIDIZE BRASS OR COPPER, immerse the articles in a solution of two ounces nitrate of iron and two ounces sodium hyposulphite to one pint of water until the desired shade of oxidation is acquired; then wash, dry and burnish.

THERE is a deposit of fuller's earth at Poso, 17 miles north of Bakersfield, Kern county, Cal., that is of commercial importance, being of high grade, suitable for filtering and bleaching purposes, etc., and partially developed.

THERE are several glaciers in the high Sierras in California, and glaciers are not uncommon in Colorado. In the latter State Hattlett's glacier is upon Hahn's Peak, in the northern part of the State, between Estes Park and Middle Park.

THE Colorado law of 1897 giving a mining tunnel a right of way through senior claims was declared unconstitutional in 1899. Tunnel companies projecting such work must secure right of way by agreement with owners of existing claims.

A CRUCIBLE ASSAY is considered to be the best for telluride ores—a not too hot fire and forty-five minutes in the furnace, sufficient being used to furnish a button of about twenty-five grams, to be immediately cupelled at a low heat, crystals of litharge forming in the cupel.

THIS paper is always pleased to publish any improvement or account of successful operation in any department of mining or metallurgy for the general good. A great part of the value of such things is the publicity thus given, whereby all are benefited without loss to any one.

THE commercial ton cost of milling is that cost in which the decrease from the ton cost of milling with only technically unavoidable loss exceeds the technically avoidable loss per ton by an amount sufficient to cumulate a justifiable profit margin over the working cost of milling.

THE chief difference between syenite and granite is that the former has little or no quartz, and, hence, a considerably lower percentage of silica. Syenite was long a term for what is now usually styled hornblende granite. Syenite is not as abundant nor as widely distributed as granite.

GOLD AMALGAM may be liquid, pasty or solid, according to the proportion of gold therein and the purity of the amalgam. With 90% mercury the amalgam is liquid; with 87%, pasty, and at 85% mercury the amalgam crystallizes. True crystalline amalgam is Au_4Hg. All retort gold contains at least .01% mercury.

A FAIR way to determine the cost of mining and milling ore per ton, after the mine and plant have been paid for is to divide the total tonnage mined and milled into the total costs; the yield per ton is the tonnage milled divided into the gross bullion product; the profit per ton is the difference between the cost and yield per ton.

THE leaser is a good man for the mine owner to listen to. In some cases he is the ideal developer. He has to be a miner; he can't be just an ordinary laborer who expects a miner's wages because he works in a mine, and if the owner can't work the mine himself or can't sell it, he might do worse than to give the leaser a chance at it.

IN the locality named in Mexico an arrastra would doubtless do good work, economically. Three 10-foot arrastras, tandem, with ore crushed to 10-mesh by rolls, ought to dispose of thirty tons every twenty-four hours. "How to build and operate an arrastra" was given at great length and complete diagrams and illustrations in the issues of Jan. 14-28, 1899.

IN northern Sonora, Mexico, the gold ore veins are chiefly in or closely associated with granitic and plutonic rock. In central and northern Arizona the same fact exists. The Congress, Arizona, vein to a depth of 400 feet traverses granitic rock in close association with a dike of plutonic rock. Near Indio, San Bernardino Co., Cal., the same conditions are noticeable.

THE theoretical horse power of a stream being 1000, its transmission as electricity 5 miles to mills would comprise a loss of about half in turbine, dynamo, wire, transformer and motor, even on the assumption that everything worked at concert pitch. Commercially pure aluminum at 35 cents per pound is about equal in cost for the same conductivity to copper at 17 cents.

WITH strict reference to accurate statement the term "tunnel" applies to a nearly horizontal passage through a hill or mountain, open at both ends, as a railroad tunnel. Ordinarily, however, the word is used instead of the term "adit," and is understood to mean a nearly horizontal passage from the surface through which a mining claim may be entered, worked or unwatered.

ANY State or territorial legislature can pass a law defining how many hours shall constitute a legal day's work in a mine or elsewhere, and the courts will, doubtless, hold such a law to be constitutional if of general application; but no legislature can enact a law that would hold regarding to rate or amount of wages. That must always be a matter to be settled by and between employer and employe.

EVERY vein runs in some general horizontal direction or course, which is called its "strike." The inclination or angle which the vein takes from a horizontal plane on the surface of the ground is called its "dip." The pay ore occurs in independent bodies in the vein and are called "ore chutes." The inclination which those bodies assume is called the "pitch of the chute." There is no limit to the length or number of chutes which may exist in a vein in any mine.

PROPERLY USED, a steel scraper for a copper plate in a stamp mill is a useful tool. Made from $\frac{1}{16}$-inch steel, 3 inches wide, ground square across so as to give two right-angled edges, it will break through amalgam formed in hard scale and crack it off like so much dried putty, leaving the plate with a soft, shiny surface. It is particularly essential with some ores in connection with the inside plates where the scouring of the pulp seems to harden the amalgam.

ORDINARILY in California drift mining the timbering is kept close up to the working face. In place of running the caps from post to post with close lagging overhead, it is usual now to set a cap over a post T-shape, wedging it tightly to the roof, fewer posts and caps and less lagging being thus required. Where the roof is cemented, gravel or lava, posts alone, or posts and caps are employed. The cost of such timbering approximates 5 cents per ton carload.

CONCERNING the boiler explosion regarding which there was a full page illustration and extended comment in the issue of Jan. 26, it is learned that the coroner's jury declared that the accident was due to "the boiler plant being of insufficient capacity and worked too hard." It is officially stated that the direct cause of the explosion was an old crack on the inner edge of one of the horizontal lap joints, partly between and partly outside the rivet holes.

ELECTRICITY is considered to be due to a vibration of the ether of space; light, heat and electricity are considered different forms of manifestation of the energy of ether vibration. A variety of experiments and observations have shown so intimate a connection between the phenomena known as "electricity" and "light" that most modern scientists consider the electro-magnetic theory of light to be the correct one.

FLUORSPAR is mostly used for melting iron in the cupola, in making open-hearth steel, as a flux in smelting, and in cleaning iron castings. The most of the United States product comes from Kentucky. It is worth about $8 per ton at the mines. Limestone is generally used as a flux in a cupola furnace. It fluxes off the silica of sand adhering to the pig iron and scrap. It also takes up any silica produced by oxidation of the silicon in the iron and combines with the ash of the coke. A combination of fluorspar and limestone is often found to be of good result.

WHERE a mining claim is located for a stated width and length, and after the monuments have been fixed and described in the location notice, and the latter posted and recorded, it is found that less length or width than that claimed has been included within those monuments, they can be changed, or, if stakes, can be moved out, to get the claimed length and width—provided such additional ground is still subject to such location, and also provided that when such extension is made a new notice of location, describing the stakes or monuments as fixed by the change, is posted and recorded.

THE legal way for the owner of a mine giving a lease or working bond to protect himself and the mine from liability for material furnished or labor done thereon under the lease or bond is to conspicuously post notices, before such work is begun, that the work is to be done, under bond or lease, to So-and-So (naming the parties), and that the owner disclaims for himself and the mine all liability for cost of such work. He should also have in the bond or lease a distinct condition that the parties of the second part shall pay for all work and labor under such lease or bond, and that paper should be duly recorded.

A CHLORINATION PLANT operating four ovens should be able to work 500 tons concentrates per month. The average cost in California or Colorado would be about $6.75 per ton. A fair extraction would be 90%. The relative merits of cyaniding and chlorination have been repeatedly discussed herein. What is best for the ore is the best process. It all depends on local conditions. A drum of liquid chlorine holds 115 pounds, and is equivalent to 972 pounds manganese, 1080 pounds salt and 2160 pounds sulphuric acid. The drum is 10 inches diameter, 5 feet long, and costs, laid down, from $35 to $45.

BRASS or copper pipe may be bent without flattening or breaking by being filled, while yet straight, with rosin that has been heated or melted until fused. After it has cooled and become solid again, the pipe may be bent into almost any desired shape. When bent as desired, heat the outside of the pipe until the rosin melts and runs out. With iron pipe the use of rosin is unnecessary. Heat the metal to a bright red; then from a squirt-can filled with cold water throw a fine stream on the inside of the bend, keeping it cool, while the outer part is still red hot. In this way the inner part is kept from breaking, while the outer part stretches and curves.

NECESSITY determines the amount of water required to run a 10-stamp mill. Where water is so plentiful that it makes no difference how much is used, there may be required 1½ miner's inches—about 840 gallons—per hour. In arid regions, where water is precious, a 10-stamp mill may be run on half that amount by the use of water-saving apparatus that recovers the water for reuse. Much, too, depends on the ore. Quartz can be worked on eighty gallons per stamp per hour; clayey ores will sometimes require 100 gallons per stamp per hour. In this economy of water in desert regions the gas engine engine also plays a prominent part.

IN Siberian placer mining the trough used consists of a rectangular box, open at the top and fitted at the bottom with a perforated iron plate, ½ to 1 inch holes. The dirt is shovelled into this box, and if the gold is fine, mercury, not exceeding ten parts to every one part of gold, is added. Water is then led or pumped in, and the fine material is washed down through the bottom screen plate and falls onto inclined tables of about 20 feet length by 20 inches width. These are provided with five riffles, of which the upper two are 2 inches high, and the others of less height. The disintegration of the material is completed on the tables by workmen using a small rake. When disintegration is finished, the stream of water is diminished; and, if the gold is fine, and mercury has not been previously added in the hopper, a little is now sprinkled on the sands, the raker meanwhile continuing to rabble the material accumulated behind the riffles, pushing the contents of the lower ones up the table again, until the contents are thoroughly cleansed. More water is then added, the pyrites washed away, the magnetite removed by a magnet, and the gold and amalgam collected. The black sands are treated over again with the next charge. The Siberian trough treats about 500 pounds of dirt at a time, or about five tons per day.

Questions and Answers.

I own eight mining claims in Kern county, Cal., all paid for. Want a U. S. patent; what will it cost? How will I go about it? I want to put on a first-class 20-stamp mill, with all modern requirements, with all appliances, complete. What will that cost? W.
Wilkesbarre, Penna.

In securing patent to a mineral claim, first send to the office of the Surveyor-General a certified copy of the location notice and $35 for office fees. That office then authorizes the survey. The applicant makes the financial arrangements with the surveyor. The surveyor makes return to the Surveyor-General's office of his notes, etc., where the clerks plat the claim and check up the survey. They then send the applicant two copies of the plat and a copy of the field notes. One copy of the plat he posts up on the claim. The other he files at the land office and makes application to the register for a patent. The application is sent forward from the land office to the Commissioner of the General Land Office, and from this latter office the patent finally issues. The land costs $5 per acre. Proof must be filed with the register of the land office that $500 worth of labor has been performed for each claim. This proof must consist of a certificate from the U. S. Surveyor-General.

A 20-stamp mill will cost from $25,000 to $60,000, according to style and completeness. On page 188 of the issue of Aug. 18, 1900, is an illustrated description of a 40-stamp mill at Weaver, Arizona, completed Aug. 1st, that cost $150,000.

Does the presence of foliated mica pockets 1x2x¾ inch thick, in the surface rock, point toward the probability of the existence of larger pockets at greater depth?
St. Paul, Minn. H.

Yes, is the answer to a question so qualifiedly worded. "Pockets" of mica, however, at any depth, are not susceptible of any great commercial development.

Men are making pins, watch charms, etc., from the enclosed, but no one here knows what it is. Is it not a gem of some kind? T.
White Hills, Ariz.

The handsome green rock is not hard enough for a gem. It is a massive pyrophyllite (an aluminous talc), and belongs to the serpentine-talc group.

At the present price of copper the smelters are paying $2.70 per unit. Please explain how they figure the price.
Solomonville, Ariz. S.

The unit of weight is 20 pounds=1% of copper in the ore. Suppose the ore carries 5% copper, or 100 pounds to the ton; the smelter, paying $2.70 per unit, pays five times $2.70—$13.50 per 100 pounds of copper contained.

What is the enclosed mineral, and what is it worth?
Visalia, Cal. J.

It is a graphitic mica schist, carrying no values.

What is the "assay ton system" you mentioned in your paper of Jan. 26 as having been invented by a New York assayer? M.
Redding, Cal.

It is nothing new, and is a well-known system of weights in general use by assayers. There are 29,166.6 troy ounces in one ton avoirdupois—2000 pounds; the "assay ton" contains 29,166.6 grams, so that if one assay ton of ore is taken for assay and the resulting button should weigh say ten milligrams, then the assay value of that ore is ten ounces per ton. One ounce per ton would be 0.00343%.

There are three of us who have a mining claim; my partners want to go ahead and develop; I don't want to keep on; I can't pay for my share of the work, and don't believe it worth developing anyhow. Can my two partners hold me liable for my share of the expenses? J.
Burke, Idaho.

No. You can quit whenever you feel like it, and can refuse to be responsible for any further expense of any kind in connection with the matter—provided you and the other co-partners have no special partnership agreement. Meanwhile, if your two companions go on with any work on the claim, they can advertise you out at the end of the year, and after such notice your interest therein becomes theirs.

I located a claim in July, 1899, but did no work on it. Now I want to work it, but am in doubt as to how to go ahead. S.
Republic, Wash.

Proceed as though it had never been located. Your location lapsed December 31, 1900, by failure to perfect claim. If no one else has located the claim since January 1, 1901, you have the same rights—no more, no less—that any one else has. But if others have legally located over your first location, you have lost all right thereto.

What is the enclosed specimen? I am assured it is to be had in this locality. T.
Bingham, Utah.

It is variscite, a green gem stone of value and exceedingly scarce in this country. If it can be found at Bingham the matter is one of importance. Its presence seems, however, to be confined to the vicinity of Mercur, Utah.

In an article I find the words "artesian positive" and "phreatic" applied to water. I fail to see in what connection. L.
Bakersfield, Cal.

Presumably the article was on irrigation methods. As applied to wells, "artesian positive" means a well from which the water rises above the surface. "Phreatic" is technically a species of ordinary well supplied by percolation and absorption as distinct from artesian.

I made application for a patent some time ago, and now am told that I must keep on doing annual assessment work. How is this? W.
Baker City, Or.

You don't tell enough to afford ground for intelligent reply. If you made application for patent, pushed proceedings, and have paid your money, and can prove it by official receipts, you will get your patent all right, and, meanwhile, need do nothing further pending its receipt, which will forever exempt you from any further work or expense to prove title; but the mere filing of an application for patent does not suspend the obligation to keep up the required annual work. If the purchase money has not been paid and the application is allowed to sleep, the claim is open to relocation, unless you keep up the annual assessment work, and can prove that you have done so.

We want to save free gold by "sluicing," as you call it in California, and would like some few suggestions as to the custom in the States. L. T.
Wellington, New Zealand.

"L. T." would best buy some standard work thereon, like that of Bowie, Randall or Longridge. The saving of fine gold by sluicing is an art in itself, to be acquired only by study and practical experience. Assuming that the first principles of the science of gold sluicing are understood, it is then to be determined by local conditions as to individual requirements. In California success has been attained by shoveling the material into boxes 16 inches wide, 9 inches deep, set at a grade of 7 inches to every 12 feet, the bottoms gradually flaring, the last box being 32 inches wide, the shape spreading to throw the gravel, etc., so that the gold must touch the blanket riffles and there remain. At the bottom the water flows into a V-shaped trough, covered with fine wire gauze, the fine sand and gold carried at right angles from the box into a large tub, the coarse gold falling over outside. Riffles are of various shapes and materials, from steel to grain sacks. The question would require a volume for adequate answer.

Can slags from reverberatory furnaces, going 30% copper, be put through a blister furnace economically producing metallic copper? S.
Elizabethtown, N. M.

The question is a little confusing, unaccompanied by detailed statement. Usually in case of smelting of copper matte smelted by the reverberatory process, the "slag" containing copper is returned to the blister furnace, where it aids in the production of metallic copper. "Slags" from blister and matte smelting furnaces are susceptible of reduction in a cupola or blast furnace by use of iron pyrites, producing a secondary matte and slags practically free from copper. A smelting mixture of that kind for such furnace would be made up about as follows: Coke, 350 pounds; matte-smelting slag, 2500 pounds; blister-slag, 300 pounds; pyrites, 600 pounds; carbonate of lime, 400 pounds.

We have had a discussion as to the best drop for a stamp and agreed to leave it to you. I favor in a 5-stamp mill 1, 3, 5, 2, 4. K.
Placerville, Cal.

This is a case of "where doctors disagree." There is no standard; it is largely a matter of opinion. Every mill man has his own reasons for firm belief that the manner of drop in his mill is the best; 1, 3, 5, 2, 4 is good; so is the reverse order, 1, 4, 2, 5, 3. Some think 1, 5, 2, 4, 3 is about right; it makes uniform the splash of the water and pulp in the mortar; No. 1 dropping, sends the water through the battery lengthwise, which No. 5, in falling, catches and throws back; the same with No. 2, sending it back to No. 4 in its descent, No. 3 equalizing the swash. California mill men also use 3, 5, 1, 4, 2; 1, 5, 2, 4, 3; and 1, 3, 5, 2, 4. The 1, 4, 2, 5, 3 is probably as good as any. As noted, it spreads the pulp well. In a good splash a wave runs along the lower edge of the screen, moving backward and forward from end to end. A good wave motion starts from the center stamp; that latter start is thought by some to secure the greatest amount of discharge; others think that more crushing is done by first dropping the end ones. All seem to agree that in a 5-stamp battery no stamp should drop directly after the one next to it, one stamp at least intervening; the idea being that at the exact moment the stamp drops, the stamp on each side should be raised enough to allow the ore to be spread beneath, thus equalizing the splash and discharge through the screens. Some give the end stamps ½-inch to 1 inch more drop than the others, to prevent the pulp from banking at the ends of the mortar. Then these end stamps will soonest strike the cams, preventing the others from being run at the higher speed that their shorter drop would otherwise allow. It is not unusual to find a mill man using end stamps heavier than the rest in a 5-stamp battery and allowing the same drop for all five, claiming good results in a fast-drop mill.

An oil company agent here assures me that the stock in that company can not be assessed, and that, if I buy stock, it can not in any way cost me any more. Is that right? O.
Los Angeles, Cal.

No California corporation stock is non-assessable. Any stock in any California company is liable to assessment. It does not follow that it will be assessed, but there can be no legal assurance that it is non-assessable.

What is the "miners' ton," and where is it in use? I see mention of it; but we know nothing of it here. T.
Deadwood, S. D.

It is a form of weight still in use in Great Britain and on the Continent, where ores and mattes are sometimes sold by the "miners' ton," which consists of 21 cwt., of 112 pounds each, or 2352 pounds.

What is the best record of use of cyanide? We hear of solutions running from eight ounces to two pounds per ton. L.
Eureka, Utah.

It would be impossible to give the "best" record; probably what is wanted is statement as to the smallest amount used. At the Mercur, Utah, ten ounces per ton of ore treated is used; at the Daisy, Utah, four ounces per ton; at the Sacramento, Utah, 5½ ounces per ton. The range is a wide one, running from 3¾ ounces to five pounds per ton. The matter is one of local requirement, though proficiency in cyanide practice usually lessens the amount required to the minimum.

I have four locations, and want to know if I can not get a patent by proving that $500 worth of work was done on one of them. They are all adjoining, and what is done on any one of them develops all four. I know of men who have got a patent for three adjoining claims by doing $500 worth of work on one of them. The rule ought to work for four. S.
Randsburg, Cal.

You must show $2000 worth of work done before you can get a U. S. patent. The $2000 means $500 for each one of the four claims. If they are adjoining and owned in common, and the work done on one tends to develop all four, then the whole $2000 can be spent on any one of them for all. Up to July 1, 1898, the holder of adjoining claims could do $500 worth of work on any one of them, if such work tended to develop all, and get a patent for all of them that way; but since that date, in the case of adjoining contiguous claims, there must be $500 worth of work done for each claim before the owner can get a U. S. patent. Doubtless, in the case you cite, where the owner got a U. S. patent for three adjoining claims by doing $500 worth of work on one of them, application was made before June 30, 1898.

A says there is a tax on the issue of certificates of stock in stock corporations, for the benefit of the Mining Bureau. B says there is not. Which is right? P.
Los Angeles, Cal.

B. That is, if California is meant. There was such a California statute, but it was repealed by the Legislature four years ago.

What is meant in one of your recent issues by "dore bullion," and "wet" and "dry" ore?
Columbus, Ohio.

"Dore bullion" is silver bullion containing a small percentage of gold. "Wet" ore is a smelter term for ore containing a high percentage of lead or copper. If an ore carries less than 5% of either of these metals, it is a "dry" ore.

How can I best assay a quicksilver ore that I think contains 1% mercury, but carries arsenic too? G.
Calistoga, Cal.

It might be mixed with about five times its weight of litharge, and, heated in a retort, there would result a semi-liquid mass, which would be sulphuret of arsenic, and cinnabar, the latter decomposed into sulphurous acid and metallic mercury. With a moderate heat the quicksilver would be entirely volatilized, and would collect in the condensing apparatus and the farther part of the neck of the retort. Care would be necessary to very gradually and gently heat the retort to the required temperature, lest it be perforated by the effects of the litharge before the complete volatilization and condensation of the quick.

Suppose that I have a placer claim patented, and a man comes along and starts to locate a quartz lode claim within its limits, have I no redress?
Breckenridge, Colo.

That depends; you do not state all the facts; in any case, you have certain rights. If your placer claim patent was applied for before the other man located the lode claim, he has no standing at all. If, however, he made discovery and legally located a

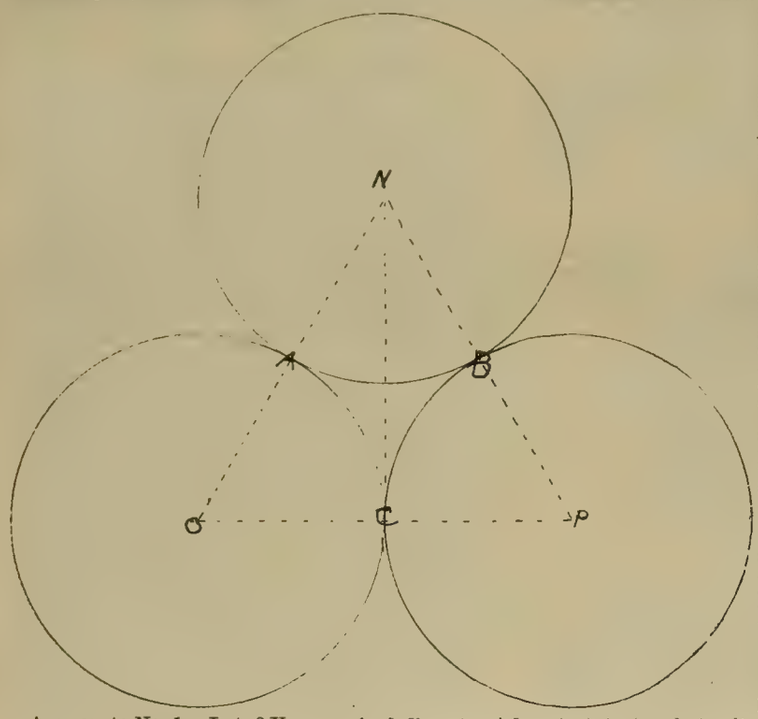
lode claim within the limits of your placer claim before you made application for patent therefor, he would have superior rights to you, and the placer location to the extent of his lode claim would have to yield thereto.

I enclose two problems which have puzzled our best figurers. Would like to have them solved:

No. 1. If A B C be one acre of land enclosed by three equal circles, what is the diameter of each circle?

No. 2. I have a house in one end of the triangle and my friend a house in the other. How far on the perpendicular from the base should we put our line fence to give each of us an equal acreage?

Washington, Nevada Co., Cal.



Answer to No. 1. Let $2X$ = required diameter, when X = radius. Let N, O, P, be the centers of the three circles. Then the triangle formed by joining these points will be equilateral, each side being equal to $2X$.

$ABC = NOP - (OCA + CPB + ABN) =$ 160 square rods.

$OCA = CPB = ABN.$

Area of $NOP = CP \times NC = X\sqrt{3X^2}$.

Area of $OAC = \frac{1}{6}$ area of circle with radius X.

Area of $OAC = \frac{1}{6} X^2\, 3.1416$.

$\therefore X\sqrt{3X^2} - \frac{3}{6}X^2\, 3.1416 = 160$ square rods, 1 acre.

$X^2\sqrt{3} - 1.5708\, X^2 = 160$ square rods.

$1.7321\, X^2 - 1.5708\, X^2 = 160$ square rods.

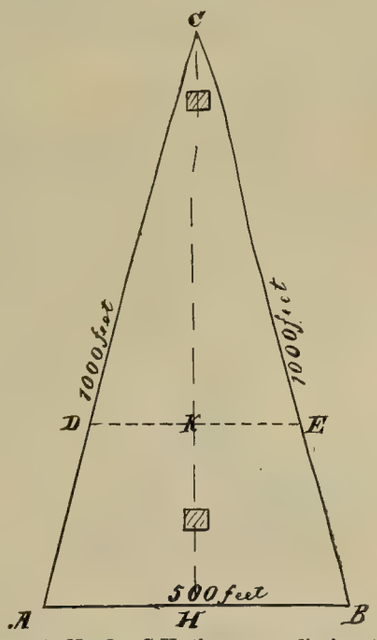
$\therefore .1613\, X^2 = 160.$

$X^2 = 991.94.$

$X = 31.4.$

$2X = 62.8.$

$\therefore$ diameter of circle = 62.8 rods.



Answer to No. 2. C H, the perpendicular to the base $= \sqrt{1000^2 - 250^2} = 968.24$. Similar triangles have the same ratio as the squares of their corresponding sides.

A H C is similar to D K C. But as D K C is equal to one-half D E C, which is itself one-half of A B C, and as A H C is also one-half of A B C, then the ratio of A H C to D K C is 2 to 1.

$\therefore CH^2 : CK^2 = 2 : 1.$

or $968.24^2 : X^2 = 2 : 1.$

$2X^2 = 937.500.$

$X^2 = 468.750.$

$X = 684.602.$

$\therefore$ the distance $KH = 968.24 - 684.602 = 283.638$ feet.

$\therefore$ the division fence is placed 283.638 feet on the perpendicular from the base.

I have asked for information concerning how the unit of weight is fixed and the method of quoting prices on ore, and the enclosed has been supplied by the journal asked. I do not understand it, and ask your opinion as to its accuracy:

"The unit of weight is 20 pounds avoirdupois. It is 1% of copper in the ore, and 1% of a ton—2000 pounds—is 20 pounds. Each per cent of copper contained in the ore is equal to as many units. Ore carrying 50% of copper (or fifty units)—if copper, for example, is quoted at $4 per 100 pounds—is worth 60 cents per unit, and fifty times sixty equals $30 a ton. For each decline or rise of 5 cents in the quotation a deduction or addition of 1% should be made. If the quotation is $3.95, then 1% from the price (60 cents) should be taken, making 59 cents the settlement price, and so on down to whatever the quotation may be. If the ore is quoted for example, at $3.75, 5 cents from 60 leaves 55 cents per unit, and ore carrying 50% of copper would amount to fifty times fifty-five, equaling in value $27.50 per ton."

Denver, Colo. I.

The question you ask lacks definiteness. You do not state to what unit of weight you refer, nor whether it is the quoted price of copper or lead. As to giving an opinion on the quoted answer you got from some other journal, we hesitate to make comment, as such is contrary to our usual custom, it usually taking all our time and effort to guard against mistakes—leaving none for noticing those of others. However, concerning the answer you state was furnished you, it has been floating around for several months. It originally appeared in an Eastern journal. The writer was evidently mixed in his illustration, as it applies to the Colorado method of quoting prices on lead ores. The price of copper, as you know, is about 17 cents per pound, and therefore it seems a mistake, in illustrating the method of figuring, to take a price as low as 4 cents, though the fact that he took 4 cents as a basis indicates that he was illustrating the method in which lead was figured rather than copper. He is also mistaken in his figures wherein he states "if copper is quoted at $4 per 100 pounds it is worth 60 cents per unit." As a unit is one-fifth of 100 pounds, a unit, or 20 pounds, would be worth 80 cents, instead of 60 cents. If copper were worth $17 per 100 pounds, and the price should drop to $16.95, this would make naturally a shrinkage in the price per unit of 1 cent, as every drop of 5 cents per 100 pounds would be equal to a drop of 1 cent for each unit, or 20 pounds. As a fact, however, copper usually fluctuates to the extent of ½ or ¼ cent per pound, and we do not recollect having seen any quotations for copper per unit in less multiples than 5. That is, a change in the quotation would hardly be made unless copper had changed to the extent of 25 cents per 100 pounds, which would then make a change of 5 cents per unit. Lead, being a cheaper metal, fluctuates from 2½ to 5 cents per 100 pounds, and consequently the price per unit is changed for every change of 5 cents per 100 pounds.

In the issue of December 29, page 607, is a process of reducing copper and zinc ores. I have made some tests on it, but not entirely successful. I used sodium sulphate, sulphuric acid and water, in the proportions suggested, and made a solution of 5%. How much copper should such solution dissolve? Will this solution dissolve ores of copper and zinc, or copper alone and zinc alone? H.

Pelton, Texas.

It is impossible to tell what quantity of the solvent, as indicated in the article, will be required in each individual case, since this must necessarily depend upon the nature of the copper-zinc ore treated. But a simple test consists in covering a weighed quantity of the powdered ore, whose copper and zinc contents are known by chemical test, with the solvent in an appropriate vessel, drawing off the solution after standing for twelve hours, washing the leached residue with water, drying the same, and having it analyzed again for the copper and zinc percentages remaining. Results obtained in this manner will show whether the leaching was partial or perfect, and what remains to be done. The solvent dissolves the copper and zinc present simultaneously, so that a mixture of copper and zinc salts in solution results. If there is no zinc present in the ore, the copper will be dissolved; and in case there is no copper, the zinc values will be extracted. Gold and silver values, eventually present, must be looked for in the residue.

Could you give me any information in your particularly up-to-date paper as to the following points: In a sulphide copper ore, what is generally meant by the words "self-fluxing"—that is, what proportion of Cu, Fe, Ca, Au, Al may be called perfect fluxing ore? Are the proportions always fixed, and do the fluxes added have to be so proportioned as to bring the mixture up to some definite percentage? How would you class the accompanying analyses:

	No. 1.	No. 2.	No. 3.
Silica	43	75	60
Iron	12	6	6
Alumina	16	1	3
Lime	4	9	10
Sulphur	6	3	5
Magnesia	6	2	8
Copper	10	4	9

Princeton, B. C. S.

By the expression "self-fluxing ore" is meant ore that contains all the necessary ingredients to make a clean slag without adding any fluxes to the charge. The question as to what would be the percentage of copper, iron, lime, silica, alumina necessary to constitute a fluxing ore is too broad a one to be answered in a few words. It depends upon what style of furnace is to be used, and what kind of slag it has been decided upon to make. All three analyses submitted by our correspondent, marked 1, 2 and 3, are too high in silica to be termed self-fluxing ores. Even No. 1, which is the lowest in silica, will need the addition of iron if reverberatory furnaces are to be used for smelting, and iron and lime in case blast furnaces are decided upon. Nos. 2 and 3 will need a great deal more of fluxes in the shape of iron and lime than No. 1, and if these fluxes do not contain any metal values in the shape of copper, silver or gold, and can not be had at reasonable price, it is a hopeless case to do anything by smelting, at least as far as Nos. 2 and 3 samples are concerned. Possibly our correspondent could improve his ore by concentrating. This means eliminating a certain amount of silica and leaving the concentrates in such a shape that the iron would be enriched. If a part of the silica is eliminated, it would give a self-fluxing ore for either reverberatory or blast furnace work.

A variety of other questions are answered, as usual, in "Concentrates" on page 81.

Capacity Lost by Air Compressors Working at Different Heights Above Sea Level.

The altitude above sea level at which an air compressor is to operate is an important point, the air being less dense at an elevation than at the sea level. When working at an elevation the compressor takes in less air at each revolution than at a lower level, its capacity is diminished, and there is a corresponding reduction in the power required to operate it. Following is a table showing the efficiency and loss in capacity of compressors working at different altitudes. It is computed for air compressors delivering air at sixty pounds pressure per square inch

Altitude above sea level, feet.	Barometer, inches.	Efficiency of compressor, per cent.	Loss, per cent.
0	30.00	100.0	0.0
500	29.42	98.4	1.6
1,000	28.85	96.9	3.1
1,500	28.34	95.5	4.5
2,000	27.78	94.0	6.0
3,000	26.74	91.1	8.9
4,000	25.70	88.1	11.9
5,000	24.73	85.9	14.1
6,000	23.83	82.8	17.2
7,000	22.93	80.2	19.8
8,000	22.04	77.5	22.5
9,000	21.22	75.1	24.9
10,000	20.43	72.7	27.3

A Water Wheel Record.

The motive power in the Kinkead mill is furnished by a Pelton water wheel 18 inches in diameter, running under a pressure of 200 pounds to the square inch and using 12 miners' inches of water in twenty-four hours, which develops 15 H. P. The wheel makes 1000 revolutions per minute, which gives a periphery speed of 4500 feet per minute, equal to 1227 miles in twenty-four hours. As the wheel has been running almost constantly for five years, the buckets have traveled over 2,000,000 miles. The belt on the wheel travels 1000 feet per minute, or 272 miles per day, and has traveled during the five years about 500,000 miles. While the belt has been renewed six times during the five years, the shaft on the wheel has been renewed only once, and the buckets have never been replaced. During the five years the little wheel has furnished the power to crush over 60,000 tons of ore. The wheel only cost $125 originally and the repairs on it for five years did not exceed $10.—Enterprise, Virginia, Nev.

Commendatory Comment.

"We are advertised by our loving friends."—Shakespeare.

During Dec., 1900, and Jan., 1901, this paper has been even more than ordinarily favored by kindly comment and personal expression of good will. Fortunate, indeed, is the paper that after forty years finds favor in an ever-widening circle of readers who are pleased to commend its efforts to be useful. Its columns weekly speak for themselves, but it may not be deemed out of place to publish a very few of the multitude of kindly little messages received during the last sixty days. They are samples of what is constantly received and cordially appreciated.

"Send me two copies for 1901; the one I have been getting is always worn out by being passed around among the others. I want to file it," writes a Leadville, Colo., mine manager.

"What I like particularly about your paper is its absolute reliability," says a Globe, Arizona, subscriber.

"I want your paper most of all for its advertisements," is the statement of a Rossland, B. C., reader.

"I would just as soon pay you $10 a year as $3. I think it is the best mining paper published, and I get them all," writes a Victor, Colorado, mine operator.

"The MINING AND SCIENTIFIC PRESS has the real mining flavor, and every one here likes it," comments a Wardner, Idaho, patron.

"I regard your paper as the best and most useful investment I make. I appreciate its high standard and constant reliability," writes an Ashland, Oregon, reader.

"Were the money made and saved by the MINING AND SCIENTIFIC PRESS for the mining industry of the country put together, it would pay the national debt," is the opinion of a Chicago, Ill., mining engineer.

"I enclose renewal of my subscription for 1901 for the best mining paper in the world," writes a Seattle, Wash., metallurgist.

"I find your paper absolutely indispensable to me," says a Denver, Colo., assayer.

"Every issue is worth all that I pay for it for a whole year," is stated by a Plymouth, Luzerne Co., Pennsylvania subscriber.

"You always seem to have just what we want," writes an Elizabethtown, New Mexico, reader.

"My San Francisco representative will call for the two missing numbers. I can not afford to lose from my file a single copy of so valuable a paper," says a mining engineer writing from Buenos Ayres, Argentine Republic, South America.

"You know I am not given to praise, but will say that your issue of Jan. 5th has more matter of live and vital information to the practical mining engineer than any other similar amount of printing that has come under my observation," is quoted from a letter sent us by a mining man of national fame, writing from Boston, Mass.

"Nothing can supply the place of the MINING AND SCIENTIFIC PRESS. We consider it an absolute necessity," says a Kalgoorlie, West Australia, mine manager.

"When we want to know anything about mining or settle any question, we always have a reliable friend in your paper," says a Sutter Creek, Cal., mine superintendent.

"Yours is a particularly valuable paper to us here, and I admire it," asserts a Princeton, B. C., subscriber.

"I know of no publication that has done more for the mining industry," says a foremost mine manager of Aspen, Colo.

"The position I hold and the salary I draw are mainly due to reading your excellent paper," writes a Cœur d'Alene, Idaho, mine superintendent.

"I have noticed that your paper is never afraid to tell the truth, and that it always stands by the miner in any capacity," comments a Juneau, Alaska, miner.

"Through the years your paper has been an inspiration and a help to me," writes a Clear Creek Co., Colo., millman.

"I move around so much I find it difficult to be a regular subscriber, but wherever I go I find the paper, and have a big scrap book full of good things cut from the copies I constantly buy," says a Florence, Colorado, mine agent.

"Yours is the best for the mining men. It's reliable, and isn't afraid of anybody," writes a Denver, Colorado, mine manager.

"As a mining engineer, I hold in high appreciation your technical articles, and find an up-to-date air about the paper that makes it valuable here to every mining engineer," says a Rossland, B. C., mining engineer.

"Every prospector I met in my tour through this country last season had a copy of the latest issue procurable of the MINING AND SCIENTIFIC PRESS," writes a Sumpter, Oregon, mining man.

"I value the paper chiefly for the hints and points so useful in my daily business," says a San Francisco electrician.

"I have taken to filing the paper. I used to cut out the good things, but I often found something on the other side equally good that I had cut into, so now I file all the copies and preserve the index," is the experience of a Deer Lodge, Montana, mine superintendent.

An entire issue could be filled with similar brief extracts from letters written by practical men in every department of mining and metallurgy, expressing high regard and personal friendship for the paper.

THE season is a forward one. Ordinarily the California chicken with a $2.50 gold nugget in its crop is reported from Yreka about Feb. 10th. This year Alameda county reports first, two weeks ahead, and with a diamond found in the crop of the defunct fowl.

Mining and Geological Terms.

It is customary in reports of mining cases and in mention of mining properties to use words that are not often plain to the non-technical reader, and as there are some mining men who do not wholly grasp the meaning of some such terms, the accepted definition of a few is given herewith. The following is not intended as a "glossary," nor as an exact technical definition in precise accord with all authorities, but may lighten the steps of some one as he stumbles along the rocky path of mining terms:

Augite—A kind of basalt or greenstone found chiefly in eruptive rocks.

Apex—The top or summit of a vein or lode.

Borate—A rather brittle, sweetish alkaline mineral.

Breccia — Rock composed of angular as distinguished from rounded fragments, closely cemented together with lime, oxide of iron, etc. There are quartzite, volcanic and bone breccias.

Breast—The face of an ore body at which a miner is working.

Bath oolite—A shelly limestone much celebrated as a building stone.

Bifurcation—Division in two prongs or parts.

Bornite—A brittle mineral occurring massive, granular or compact, containing copper, sulphur and iron. It is a valuable copper ore found in this and almost every country where copper ore exists. It is also called "horseflesh ore."

Chalcocite—A mineral of a lead-gray color, tarnished with blue or green, containing sulphur, copper and iron.

Chalcopyrite—A sulphide of copper containing sulphur and iron of a brass-yellow color.

Contact—Close union or junction of one ore body with another.

Crosscut—A drift from a shaft to intersect a vein of ore.

Country rock—The strata in which a metallic lode is found.

Collar—When speaking of the collar of a shaft: The curbing around a shaft to keep loose ground from falling in.

Cerusite—A mineral of a white, gray or grayish-black color, sometimes tinged with blue or green by some of the salts of copper.

Drift—A passage in a mine, horizontal or nearly so, forming a road for the extraction of ore or for carrying off the water.

Dip—The inclination or pitch of a vein or stratum. The angle with the horizontal is the amount of dip.

Dyke—A bank of hard rock by which lodes are frequently divided.

Drag—Material which has been displaced by the faulting movement of a large body.

Diorite—A granite-like rock, grayish-white to nearly black in color. It derives its name from being unmistakable or clearly defined.

Fissure—A crack in the strata produced by volcanic or earthquake action or subsidence. Most fissures are filled from below and become metallic or other mineral veins.

Ferrous—Anything having a considerable quantity of iron in its composition, as "ferro-manganese."

Fault—The sudden interception of the continuity of strata, until then upon the same plane, this being accompanied by a crack or fissure varying in width from a mere line to several feet, and generally filled with broken stone, clay or similar material. There are faults in some sections of which the horizontal extent is 30 miles or more and the vertical displacement varying from 600 to 3000 feet.

Foot wall—The side of the rock under a mineral vein; the underlying wall.

Felspar or feldspar—A genus of minerals rather than a single mineral.

Gangue—The mineral matters in which metallic ores are embedded.

Granitic — Pertaining to or of the nature of granite.

Horse—A mass of earthy matter intervening between the branches of a vein. The vein straddling on each side of a non-mineral rock is said to take horse.

Hanging wall—The overhanging side of an inclined vein.

Hornblende—One of the five most abundant simple minerals of which rocks are composed, the others being felspar, quartz, mica and carbonate of lime.

Infiltration—The process of filtering in or penetrating the interstices of rock or other matter.

Kaolin—Found in granite; generally arising from decomposition of the felspar.

Monzonite—A light grayish-green compact mineral, resembling hornstone.

Monoclinic—Having one single dip, persistent for a considerable distance.

Muscovite—A variety of mica. It is the most abundant of the micas and is a constituent of many rocks, notably granite, gneiss and mica schist.

Oxide—The product of the combination of oxygen with any metal. For instance, oxidized silver is silver on the surface of which a thin film of the black oxide has been formed.

Pseudo-morphism—The process by which one mineral replaces another.

Pyrites—An uneven, brittle mineral that strikes fire when struck with a hammer, occurring frequently crystallized.

Selvage—An edge so woven as to prevent ravling or a woven border of close rock; used in a mining sense as the outer lining of a vein or fissure at its contact with another body.

Sphalerite—The same as blende. It is used by few mineralogists, and relates to a treacherous character of rock.

Sulphide—A neutral salt of sulphydric acid.

Titanite—A mineral occurring mostly in crystals, rarely massive.

Triclinic—A term applied to one of the six systems of crystals which has no plane of symmetry.

Triturate—To rub down to a very fine powder, finer than that produced by pulverization.

Electrolytic Refining.*

In the electrolytic parting of silver and gold, it is not necessary to obtain the deposited metal in sheet form, as silver in crystals is readily melted into bars. Owing to the great value of the metals treated, the chief aim is to secure a rapid output. As high a current density is therefore employed as is possible without unduly heating the electrolyte or carrying over impurities from the anode. Short circuits produced by the bridging over of silver crystals from cathode to anode, when high current densities are used, can be avoided by scraping off the silver crystals.

The old Moebius process, in use at Pittsburg, Pa., and Perth Amboy, N. J., and in which a fixed cathode is employed, is distinguished from the Moebius continuous band process, now used at the Globe smelter of Denver, Colo., and characterized by a moving silver cathode band. A few years ago Gustave Nebel, formerly an assistant to Dr. Moebius, discovered that oil will prevent the close adherence of the electrolytically deposited silver crystals to the belt, which fact has been successfully applied by Mr. Nebel to the band process as employed in the new Globe refinery.

Another important improvement made in the last-mentioned plant was the replacement of the platinum electric contact points, formerly employed, by the both cheaper and better conducting contact points of silver and the recognition of the necessity of removing the silver belts from the electrolyte when not in use to avoid their gradual solution.

The cost of parting dore silver by the Moebius electrolytic process, with careful management, should not exceed 20 to 30 cents per 100 ounces.

Regarding the electrolytic refining of gold bullion, experiments were made at the Philadelphia Mint during the past year, with the Wohlwill process, in use since 1880 or thereabouts at the Norddeutsche Affinerie at Hamburg, Germany, leading to the adoption of this process by the United States Government. The Wohlwill method of producing chemically pure gold by electrolysis, and slightly modified by Dr. D. K. Tuttle and H. J. Schlaeker, will be installed at the new Philadelphia Mint. Thus far about 2000 pounds of gold bullion have been electrolytically refined at the old Mint in Philadelphia, and, besides the pure gold, platinum and other metals of the platinum group were recovered as by-products.

The chief feature of the Emil Wohlwill process is the addition of hydrochloric acid or sodium chloride to an electrolyte of gold chloride, so as to prevent or at least diminish the evolution of chlorine at the anode and the consequent impoverishment of the gold contents of the solution electrolyzed. In this respect there is an essential departure in the behavior of gold from that of copper and silver under like conditions.

Wohlwill has demonstrated that it is practical and profitable to continuously purify impure gold and gold alloys by employing comparatively weak solutions of gold chloride and electric currents of a density as high as 100 amperes per square foot and even higher, through the combined influence of higher temperature and added hydrochloric acid.

The electrolyte used is a solution containing about 25 to 30 grammes of gold per litre, and maintained at a temperature of about 60° to 70° Centigrade, with about 20 to 50 cubic centimetres, according to the current density, of fuming hydrochloric acid with a specific gravity of 1.19, or instead 21 grammes or more of sodium chloride or common salt per litre.

When sodium chloride is employed, the amount of the compound added should in every case be limited to 100 grammes per litre of electrolyte, as otherwise the silver chloride present would be dissolved in the alkaline chloride and be deposited at the cathode with the gold, thus defeating the object in view. Therefore the amount of sodium chloride in the solution is restricted to that which will suffice to bind the chlorine evolved at the cathode.

As Dr. Wohlwill states, when the temperature of the electrolyte and the quantity of hydrochloric acid (or salt) therein are in proper accord with the density of the electric current, the anode gold, platinum, palladium and the bulk of the foreign constituents of the anode will pass into the electrolyte under the influence of the electric current. The major portion of the iridium and other metals of the platinum group remain undissolved, and with these the silver is separated as solid silver chloride. Similarly, a portion of

*Titus Ulke, in Electrical Review (condensed).

the lead is separated in the form of lead chloride as soon as the electrolyte becomes saturated therewith, or nearly so while the bismuth is separated in the form of an oxychloride, should the amount of hydrochloric acid present be insufficient to keep it dissolved. The above-described insoluble mud, which separates and readily drops off the anode in small quantities at a time, also contains a very small amount of anode scrap and gold, forming about 10% of the weight of the anode in an extremely fine state of division. The presence of this gold is due to the fact that a portion of the anode gold is at once converted into protochloride instead of normal chloride, and the protochloride immediately after formation is decomposed into normal chloride and finely divided gold.

While, as described, a portion of the anode constituents passes over into the solution and another portion subsides in the form of an insoluble deposit, pure gold is exclusively deposited at the cathode, even from solutions of constantly increasing impurity and with currents of a density of 100 amperes per square foot. The gold extracted from the electrolyte at the cathode is therefore constantly replaced, chiefly by gold dissolved at the anode, and in part by equivalent quantities of other metals; but as the quantity of gold deposited at the cathode corresponds in part with the quantity of silver, lead and bismuth converted into solid chlorides, there is a gradual impoverishment of the electrolyte in gold, which is replaced by the addition of a sufficient quantity of gold chloride.

The simultaneous accumulation of foreign constituents in the electrolyte does not affect the purity of the gold deposited, even if there is an excess of such impurities, so long as the proper amount of gold is present in the electrolyte. In fact, the presence of these foreign constituents is even advantageous to the deposition of pure gold at the cathode, because the compactness of the deposit, which is very bulky from pure solutions (especially when currents of high density are employed), increases with an increase in the impurities in the electrolyte without affecting the purity of the deposited gold.

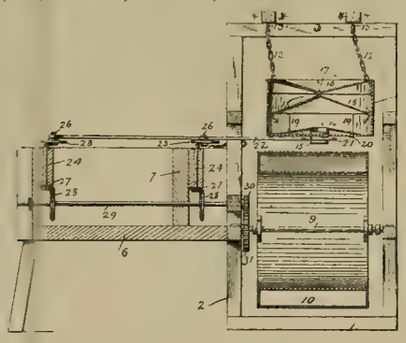
The above-described method of extracting gold permits of the recovery (from large quantities of anode materials) of the comparatively small percentage of platinum contained therein, which after the precipitation of the gold may be directly recovered in the form of ammonio-platinic chloride.

Mining and Metallurgical Patents.

Patents Issued January 29, 1901.

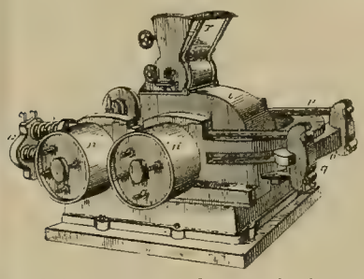
Written for the MINING AND SCIENTIFIC PRESS.

ORE WASHING AND CONCENTRATING MACHINE.—No. 666,796; C. Brash, Victoria, B. C.



An ore washing and concentrating machine, suspended receptacle for receiving water and ore, provided with outlet extending below bottom of receptacle, combined with suitable eccentrics, rod operated thereby, ring upon end of rod encircling outlet extending below bottom of receptacle, suitable curved spring placed inside of ring, means for operating eccentric.

CRUSHING ROLL.—No. 666,892; P. Argall, Denver, Colo.

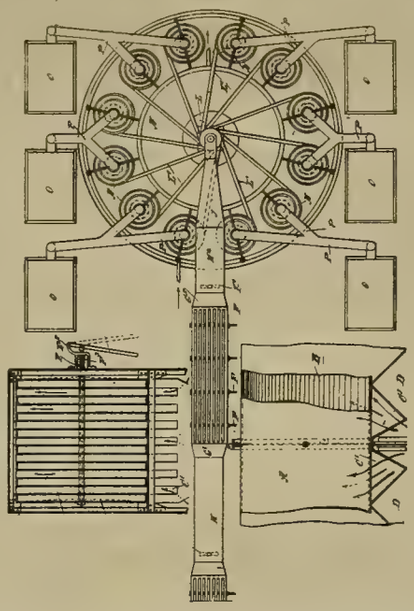


U-shaped frame mounted on main frame, horizontally movable thereon, pair of roll shafts and rolls revorably mounted in suitable bearings, one on main frame, other on movable U-shaped frame, driving pulleys fixed on both ends of each roll shaft, outside bearings, thrust collars splined on shafts between bearings and pulleys, rotating with main shafts but longitudinally adjustable thereon, screw bolts passing through fixed pulleys abutting against thrust collars, whereby latter are adjusted, springs for drawing movable roll toward fixed roll, means for simultaneously driving pulleys and rolls in opposite directions.

CONVEYER.—No. 666,865; E. Helfensteller, Jr., St. Louis, Mo.

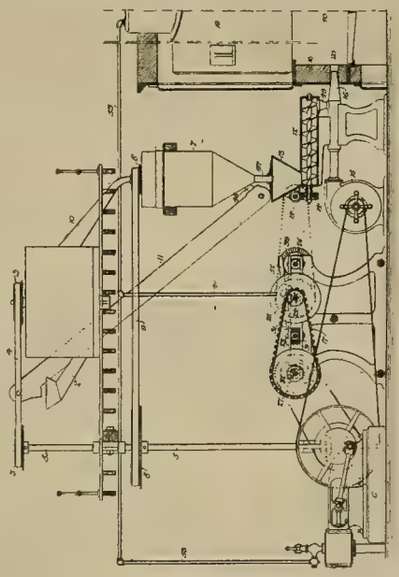
In conveyer, combination with driven shafts, of oppositely placed cams arranged thereon, cam blocks riding upon each cam, conveyer bars extending from one cam block to next, having one member engage cam to prevent lateral displacement of parts, loose connections between cam block and conveyer bars to accommodate expansion and contraction of parts.

FLUE DUST CONDENSER.—No. 666,978; P. Bruschi, Argentine, Kansas.



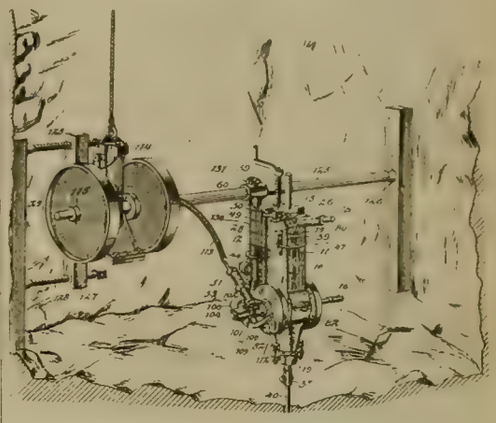
Apparatus for condensing flue dust, cooling device having narrow chambers for passage of fumes, spaced apart to form circulating air spaces between them, mixing device connected therewith into which pass fumes from cooling device for equalizing temperature of fumes, suction fan connected with mixing device, cooling precipitating cylinders, each connected with discharge pipe leading from fan, each having circular water-jacketed channel into which opens discharge pipe from fan, water-jacketed discharge pipe into which opens channel for carrying off exhaust gases, valved discharge hoppers for receiving solid matter from channel and discharge pipe.

APPARATUS FOR BURNING PULVERIZED FUEL.—No. 666,862; G. S. Emerick, Philadelphia, Pa.



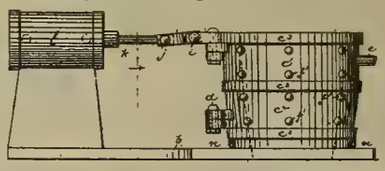
Apparatus for combustion of pulverized fuel, of grinding mill for reducing fuel to powdered form, aspirating centrifugal separator for separating finer from coarser particles of powdered mass, discharge pipe for delivering lighter separated particles into furnace, feed regulator disposed between separator and discharge pipe, means for generating air blast in discharge pipe, aspirating centrifugal separator located above feed regulator, slight lift of fine particles necessary to effect separation, particles passing by gravity to feed regulator, thence to discharge pipe.

DRILL.—No. 666,818; J. H. Redfield, Bossburg, Wash.



Drilling machine, combination drill frame, reciprocatory rod therein, shaft for operating rod having clutch member, sleeve rotatably mounted on shaft, means for holding it from longitudinal movement thereon, second clutch member mounted on shaft, means for holding it normally and yieldably against first clutch member, second sleeve inclosing first sleeve at outer end having lug, split sleeve encircling first two sleeves, split sleeve having flange engaging peripheral groove in hub of second clutch member having cam for engagement with lug of second sleeve to move split sleeve and therewith second clutch member outwardly from operative engagement, means for operating split sleeve to operatively engage lug and cam, bearing sustained by second sleeve, shaft in bearing having bevel gear on second clutch member engaging first gear.

PROTECTOR AND SHAKER FOR RECHARGING CRUCIBLES.—No. 667,131; J. Illingworth, Newark, N. J.



Improved pot shaking device, comprising engine cylinder shaking jaws, hinged together, reciprocating piston at one end working in cylinder, at opposite end having jaws loosely coupled thereto, coupling means connecting piston and jaws.

Pebbles at Considerable Depth.

TO THE EDITOR:—In your Oct. 13th issue I noticed an extract from the Georgetown, Colo., Courier on "Boulders in Mines," in which the maximum depth at which they have been found is stated to be 500 feet.

In this mine I have found small water-worn pebbles at a depth of 1150 feet from the surface.

C. H. MACNUTT.

Pulacayo, Bolivia, S. A., Dec. 7, 1900.

AT Constable Hook, N. J., the U. S. Government is building the tallest chimney in America. An excavation of 20 feet deep and 45 feet square has been made to hard gravel, filled with piles closely driven and upon the platform a base of fireproof brick 30 feet square by 30 feet in height built; on the base a round chimney of brick is to be built up to a total height of 360 feet. The stack is to be 10 feet in diameter at the top and will weigh 20,000 tons. The cost will be about $50,000.

THE New South Wales Government offers £500 to the first exploiter who produces 50,000 pounds of the metal mercury from cinnabar in that colony, the offer to hold good till 1906. The New Zealand Government has offered a premium of 4d. per pound on the first 100,000 pounds of mercury produced, a third of which quantity must be manufactured previous to March 31, 1903, the remainder before March 31, 1904.

THE Pupin invention does not do away with the necessity for the use of copper for telephone wire, but may increase the demand for copper. It will reduce the cost of equipment of telephone plants, but this very reduction will lead to more extensive installment of telephone plants. The report that Pupin's apparatus will make it possible to use steel or iron wire instead of copper is unfounded.

Commendatory Comment.

"We are advertised by our loving friends."—Shakespeare.

During Dec., 1900, and Jan., 1901, this paper has been even more than ordinarily favored by kindly comment and personal expression of good will. Fortunate, indeed, is the paper that after forty years finds favor in an ever-widening circle of readers who are pleased to commend its efforts to be useful. Its columns weekly speak for themselves, but it may not be deemed out of place to publish a very few of the multitude of kindly little messages received during the last sixty days. They are samples of what is constantly received and cordially appreciated.

"Send me two copies for 1901; the one I have been getting is always worn out by being passed around among the others. I want to file it," writes a Leadville, Colo., mine manager.

"What I like particularly about your paper is its absolute reliability," says a Globe, Arizona, subscriber.

"I want your paper most of all for its advertisements," is the statement of a Rossland, B. C., reader.

"I would just as soon pay you $10 a year as $3. I think it is the best mining paper published, and I get them all," writes a Victor, Colorado, mine operator.

"The MINING AND SCIENTIFIC PRESS has the real mining flavor, and every one here likes it," comments a Wardner, Idaho, patron.

"I regard your paper as the best and most useful investment I make. I appreciate its high standard and constant reliability," writes an Ashland, Oregon, reader.

"Were the money made and saved by the MINING AND SCIENTIFIC PRESS for the mining industry of the country put together, it would pay the national debt," is the opinion of a Chicago, Ill., mining engineer.

"I enclose renewal of my subscription for 1901 for the best mining paper in the world," writes a Seattle, Wash., metallurgist.

"I find your paper absolutely indispensable to me," says a Denver, Colo., assayer.

"Every issue is worth all that I pay for it for a whole year," is stated by a Plymouth, Luzerne Co., Pennsylvania subscriber.

"You always seem to have just what we want," writes an Elizabethtown, New Mexico, reader.

"My San Francisco representative will call for the two missing numbers. I can not afford to lose from my file a single copy of so valuable a paper," says a mining engineer writing from Buenos Ayres, Argentine Republic, South America.

"You know I am not given to praise, but will say that your issue of Jan. 5th has more matter of live and vital information to the practical mining engineer than any other similar amount of printing that has come under my observation," is quoted from a letter sent us by a mining man of national fame, writing from Boston, Mass.

"Nothing can supply the place of the MINING AND SCIENTIFIC PRESS. We consider it an absolute necessity," says a Kalgoorlie, West Australia, mine manager.

"When we want to know anything about mining or settle any question, we always have a reliable friend in your paper," says a Sutter Creek, Cal., mine superintendent.

"Yours is a particularly valuable paper to us here, and I admire it," asserts a Princeton, B. C., subscriber.

"I know of no publication that has done more for the mining industry," says a foremost mine manager of Aspen, Colo.

"The position I hold and the salary I draw are mainly due to reading your excellent paper," writes a Cœur d'Alene, Idaho, mine superintendent.

"I have noticed that your paper is never afraid to tell the truth, and that it always stands by the miner in any capacity," comments a Juneau, Alaska, miner.

"Through the years your paper has been an inspiration and a help to me," writes a Clear Creek Co., Colo., millman.

"I move around so much I find it difficult to be a regular subscriber, but wherever I go I find the paper, and have a big scrap book full of good things cut from the copies I constantly buy," says a Florence, Colorado, mine agent.

"Yours is the best for the mining men. It's reliable, and isn't afraid of anybody," writes a Denver, Colorado, mine manager.

"As a mining engineer, I hold in high appreciation your technical articles, and find an up-to-date air about the paper that makes it valuable here to every mining engineer," says a Rossland, B. C., mining engineer.

"Every prospector I met in my tour through this country last season had a copy of the latest issue procurable of the MINING AND SCIENTIFIC PRESS," writes a Sumpter, Oregon, mining man.

"I value the paper chiefly for the hints and points so useful in my daily business," says a San Francisco electrician.

"I have taken to filing the paper. I used to cut out the good things, but I often found something on the other side equally good that I had cut into, so now I file all the copies and preserve the index," is the experience of a Deer Lodge, Montana, mine superintendent.

An entire issue could be filled with similar brief extracts from letters written by practical men in every department of mining and metallurgy, expressing high regard and personal friendship for the paper.

THE season is a forward one. Ordinarily the California chicken with a $2.50 gold nugget in its crop is reported from Yreka about Feb. 10th. This year Alameda county reports first, two weeks ahead, and with a diamond found in the crop of the defunct fowl.

Mining and Geological Terms.

It is customary in reports of mining cases and in mention of mining properties to use words that are not often plain to the non-technical reader, and as there are some mining men who do not wholly grasp the meaning of some such terms, the accepted definition of a few is given herewith. The following is not intended as a "glossary," nor as an exact technical definition in precise accord with all authorities, but may lighten the steps of some one as he stumbles along the rocky path of mining terms:

Augite—A kind of basalt or greenstone found chiefly in eruptive rocks.

Apex—The top or summit of a vein or lode.

Borate—A rather brittle, sweetish alkaline mineral.

Breccia — Rock composed of angular as distinguished from rounded fragments, closely cemented together with lime, oxide of iron, etc. There are quartzite, volcanic and bone breccias.

Breast—The face of an ore body at which a miner is working.

Bath oolite—A shelly limestone much celebrated as a building stone.

Bifurcation—Division in two prongs or parts.

Bornite—A brittle mineral occurring massive, granular or compact, containing copper, sulphur and iron. It is a valuable copper ore found in this and almost every country where copper ore exists. It is also called "horseflesh ore."

Chalcocite—A mineral of a lead-gray color, tarnished with blue or green, containing sulphur, copper and iron.

Chalcopyrite—A sulphide of copper containing sulphur and iron of a brass-yellow color.

Contact—Close union or junction of one ore body with another.

Crosscut—A drift from a shaft to intersect a vein of ore.

Country rock—The strata in which a metallic lode is found.

Collar—When speaking of the collar of a shaft: The curbing around a shaft to keep loose ground from falling in.

Cerusite—A mineral of a white, gray or grayish-black color, sometimes tinged with blue or green by some of the salts of copper.

Drift—A passage in a mine, horizontal or nearly so, forming a road for the extraction of ore or for carrying off the water.

Dip—The inclination or pitch of a vein or stratum. The angle with the horizontal is the amount of dip.

Dyke—A bank of hard rock by which lodes are frequently divided.

Drag—Material which has been displaced by the faulting movement of a large body.

Diorite—A granite-like rock, grayish-white to nearly black in color. It derives its name from being unmistakable or clearly defined.

Fissure—A crack in the strata produced by volcanic or earthquake action or subsidence. Most fissures are filled from below and become metallic or other mineral veins.

Ferrous—Anything having a considerable quantity of iron in its composition, as "ferro-manganese."

Fault—The sudden interception of the continuity of strata, until then upon the same plane, this being accompanied by a crack or fissure varying in width from a mere line to several feet, and generally filled with broken stone, clay or similar material. There are faults in some sections of which the horizontal extent is 30 miles or more and the vertical displacement varying from 600 to 3000 feet.

Foot wall—The side of the rock under a mineral vein; the underlying wall.

Felspar or feldspar—A genus of minerals rather than a single mineral.

Gangue—The mineral matters in which metallic ores are embedded.

Granitic — Pertaining to or of the nature of granite.

Horse—A mass of earthy matter intervening between the branches of a vein. The vein straddling on each side of a non-mineral rock is said to take horse.

Hanging wall—The overhanging side of an inclined vein.

Hornblende—One of the five most abundant simple minerals of which rocks are composed, the others being felspar, quartz, mica and carbonate of lime.

Infiltration—The process of filtering in or penetrating the interstices of rock or other matter.

Kaolin—Found in granite; generally arising from decomposition of the felspar.

Monzonite—A light grayish-green compact mineral, resembling hornstone.

Monoclinic—Having one single dip, persistent for a considerable distance.

Muscovite—A variety of mica. It is the most abundant of the micas and is a constituent of many rocks, notably granite, gneiss and mica schist.

Oxide—The product of the combination of oxygen with any metal. For instance, oxidized silver is silver on the surface of which a thin film of the black oxide has been formed.

Pseudo-morphism—The process by which one mineral replaces another.

Pyrites—An uneven, brittle mineral that strikes fire when struck with a hammer, occurring frequently crystallized.

Selvage—An edge so woven as to prevent raveling or a woven border of close rock; used in a mining sense as the outer lining of a vein or fissure at its contact with another body.

Sphalerite—The same as blende. It is used by few mineralogists, and relates to a treacherous character of rock.

Sulphide—A neutral salt of sulphydric acid.

Titanite—A mineral occurring mostly in crystals, rarely massive.

Triclinic—A term applied to one of the six systems of crystals which has no plane of symmetry.

Triturate—To rub down to a very fine powder, finer than that produced by pulverization.

Electrolytic Refining.*

In the electrolytic parting of silver and gold it is not necessary to obtain the deposited metal in sheet form, as silver in crystals is readily melted into bars. Owing to the great value of the metals treated, the chief aim is to secure a rapid output. As high a current density is therefore employed as is possible without unduly heating the electrolyte or carrying over impurities from the anode. Short circuits produced by the bridging over of silver crystals from cathode to anode, when high current densities are used, can be avoided by scraping off the silver crystals.

The old Moebius process, in use at Pittsburg, Pa., and Perth Amboy, N. J., and in which a fixed cathode is employed, is distinguished from the Moebius continuous band process, now used at the Globe smelter of Denver, Colo., and characterized by a moving silver cathode band. A few years ago Gustave Nebel, formerly an assistant to Dr. Moebius, discovered that oil will prevent the close adherence of the electrolytically deposited silver crystals to the belt, which fact has been successfully applied by Mr. Nebel to the band process as employed in the new Globe refinery.

Another important improvement made in the last-mentioned plant was the replacement of the platinum electric contact points, formerly employed, by the both cheaper and better conducting contact points of silver and the recognition of the necessity of removing the silver belts from the electrolyte when not in use to avoid their gradual solution.

The cost of parting dore silver by the Moebius electrolytic process, with careful management, should not exceed 20 to 30 cents per 100 ounces.

Regarding the electrolytic refining of gold bullion, experiments were made at the Philadelphia Mint, during the past year, with the Wohlwill process, in use since 1880 or thereabouts at the Norddeutsche Affinerie at Hamburg, Germany, leading to the adoption of this process by the United States Government. The Wohlwill method of producing chemically pure gold by electrolysis, and slightly modified by Dr. D. K. Tuttle and H. J. Schlaeker, will be installed at the new Philadelphia Mint. Thus far about 2000 pounds of gold bullion have been electrolytically refined at the old Mint in Philadelphia, and, besides the pure gold, platinum and other metals of the platinum group were recovered as by-products.

The chief feature of the Emil Wohlwill process is the addition of hydrochloric acid or sodium chloride to an electrolyte of gold chloride, so as to prevent or at least diminish the evolution of chlorine at the anode and the consequent impoverishment of the gold contents of the solution electrolyzed. In this respect there is an essential departure in the behavior of gold from that of copper and silver under like conditions.

Wohlwill has demonstrated that it is practical and profitable to continuously purify impure gold and gold alloys by employing comparatively weak solutions of gold chloride and electric currents of a density as high as 100 amperes per square foot and even higher, through the combined influence of higher temperature and added hydrochloric acid.

The electrolyte used is a solution containing about 25 to 30 grammes of gold per litre, and maintained at a temperature of about 60° to 70° Centigrade, with about 20 to 50 cubic centimetres, according to the current density, of fuming hydrochloric acid with a specific gravity of 1.19, or instead 21 grammes or more of sodium chloride or common salt per litre.

When sodium chloride is employed, the amount of the compound added should in every case be limited to 100 grammes per litre of electrolyte, as otherwise the silver chloride present would be dissolved in the alkaline chloride and be deposited at the cathode with the gold, thus defeating the object in view. Therefore the amount of sodium chloride in the solution is restricted to that which will suffice to bind the chlorine evolved at the cathode.

As Dr. Wohlwill states, when the temperature of the electrolyte and the quantity of hydrochloric acid (or salt) therein are in proper accord with the density of the electric current, the anode gold, platinum, palladium and the bulk of the foreign constituents of the anode will pass into the electrolyte under the influence of the electric current. The major portion of the iridium and other metals of the platinum group remain undissolved, and with these the silver is separated as solid silver chloride. Similarly, a portion of

*Titus Ulke, in Electrical Review (condensed).

the lead is separated in the form of lead chloride as soon as the electrolyte becomes saturated therewith, or nearly so, while the bismuth is separated in the form of an oxychloride, should the amount of hydrochloric acid present be insufficient to keep it dissolved. The above-described insoluble mud, which separates and readily drops off the anode in small quantities at a time, also contains a very small amount of anode scrap and gold, forming about 10% of the weight of the anode in an extremely fine state of division. The presence of this gold is due to the fact that a portion of the anode gold is at once converted into protochloride instead of normal chloride, and the protochloride immediately after formation is decomposed into normal chloride and finely divided gold.

While, as described, a portion of the anode constituents passes over into the solution and another portion subsides in the form of an insoluble deposit, pure gold is exclusively deposited at the cathode, even from solutions of constantly increasing impurity and with currents of a density of 100 amperes per square foot. The gold extracted from the electrolyte at the cathode is therefore constantly replaced, chiefly by gold dissolved at the anode, and in part by equivalent quantities of other metals; but as the quantity of gold deposited at the cathode corresponds in part with the quantity of silver, lead and bismuth converted into solid chlorides, there is a gradual impoverishment of the electrolyte in gold, which is replaced by the addition of a sufficient quantity of gold chloride.

The simultaneous accumulation of foreign constituents in the electrolyte does not affect the purity of the gold deposited, even if there is an excess of such impurities, so long as the proper amount of gold is present in the electrolyte. In fact, the presence of these foreign constituents is even advantageous to the deposition of pure gold at the cathode, because the compactness of the deposit, which is very bulky from pure solutions (especially when currents of high density are employed), increases with an increase in the impurities in the electrolyte without affecting the purity of the deposited gold.

The above-described method of extracting gold permits of the recovery (from large quantities of anode materials) of the comparatively small percentage of platinum contained therein, which after the precipitation of the gold may be directly recovered in the form of ammonio-platinic chloride.

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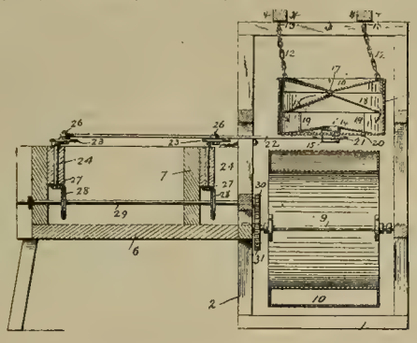

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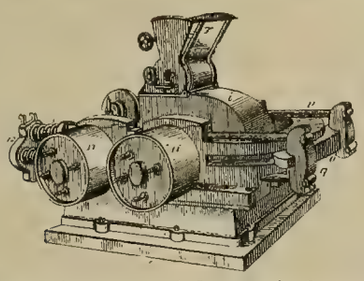

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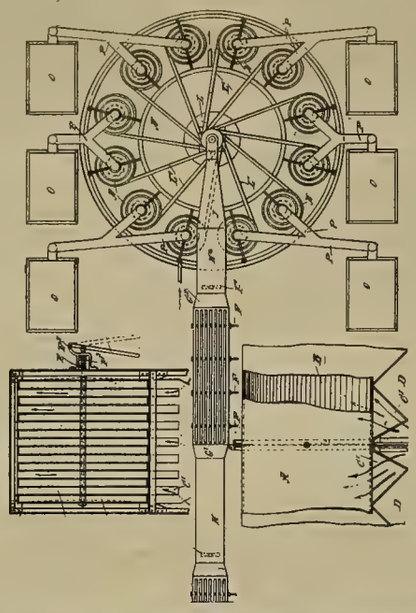

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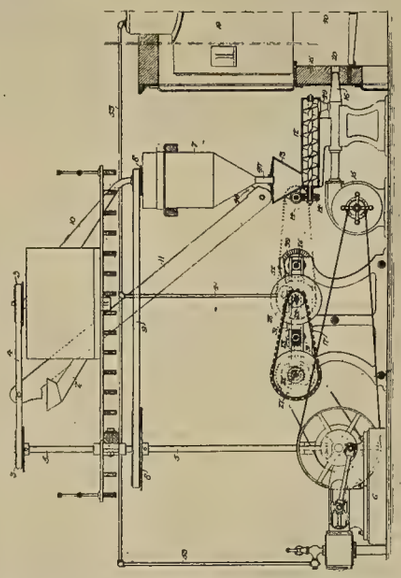

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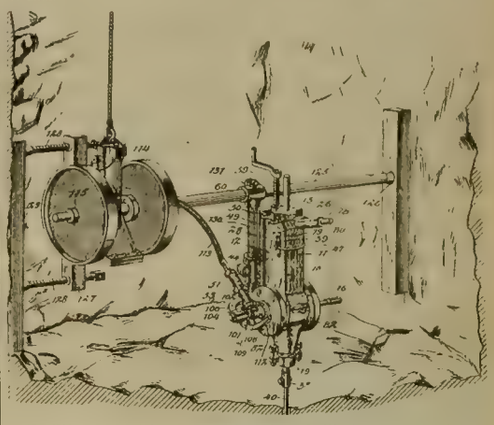

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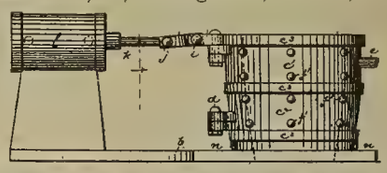

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C. H. MACNUTT.

Pulacayo, Bolivia, S. A., Dec. 7, 1900.

AT Constable Hook, N. J., the U. S. Government is building the tallest chimney in America. An excavation of 20 feet deep and 45 feet square has been made to hard gravel, filled with piles closely driven and upon the platform a base of fireproof brick 30 feet square by 30 feet in height built; on the base a round chimney of brick is to be built up to a total height of 360 feet. The stack is to be 10 feet in diameter at the top and will weigh 20,000 tons. The cost will be about $50,000.

THE New South Wales Government offers £500 to the first exploiter who produces 50,000 pounds of the metal mercury from cinnabar in that colony, the offer to hold good till 1906. The New Zealand Government has offered a premium of 4d. per pound on the first 100,000 pounds of mercury produced, a third of which quantity must be manufactured previous to March 31, 1903, the remainder before March 31, 1904.

THE Pupin invention does not do away with the necessity for the use of copper for telephone wire, but may increase the demand for copper. It will reduce the cost of equipment of telephone plants, but this very reduction will lead to more extensive installment of telephone plants. The report that Pupin's apparatus will make it possible to use steel or iron wire instead of copper is unfounded.

MINING SUMMARY.

Specially compiled and reported for the MINING AND SCIENTIFIC PRESS.

ARIZONA.

COCHISE COUNTY.

The Copper Queen Co., at Bisbee, has about 1600 men employed.——At Pearce, the new stamp mill of the Commonwealth M. Co. is running.

A 60-ton smelter is to be built at the Gleason mines, in the Turquoise district.

GRAHAM COUNTY.

The drift on the Veiled Prophet, near Clifton, now in 70 feet, will be continued to the 100-foot mark, at which point crosscuts will be run.——The General Electric Co. will probably buy properties near Clifton and put up a plant.

MOHAVE COUNTY.

Work on the Queen Bee, at Mineral Park, is resumed.——The Hass turquoise mines, at Mineral Park, are shipping turquoise to New York.

The Katie, at Mineral Park, is shipping ore.——The Tub, in Union Basin, Wallapai district, is bonded to Denver and Boston parties; a hoisting plant will go in and work will be pushed.——The Moonbeam, on Stockton hill, near Kingman, is leased to Rober & Wilson.——The Prince George and other mines on Stockton hill, near Kingman, will pass into the hands of an Eastern company; machinery will be put in and a shaft sunk below the old workings; main shaft is down 170 feet; a gasoline or oil-burning hoisting plant will be put in immediately.——A second payment on purchase price of the Billy Bryan, Gold Road and Gold Line, in Secret Pass district, near Kingman, was made recently; machinery will go in.

MARICOPA COUNTY.

On the Congress, northwest of Phœnix, two ledges of ore have been followed to a depth of 2600 feet; ore is said to run $20 to the ton.

PINAL COUNTY.

On the Half Moon, 12 miles east of Florence, water is struck at 72 feet; a crosscut at this depth showed vein to be 8 feet wide.

A receiver and manager is to be appointed for the Ray Copper mines at Florence. The company was organized in 1897; in April, 1900, were issued debentures to the amount of $486,650; the interest thereon was paid up to June 13, 1900. The appointment is at the instance of the debenture holders.

SANTA CRUZ COUNTY.

Negotiations are under way for the sale of the Red Rock, at Patagonia, for $50,000.——The new matting plant at the Pride of the West, at Washington Camp, Supt. Gee, is running steadily.

YAVAPAI COUNTY.

Over 1000 tons of ore are reduced daily at the United Verde, Jerome.

At Jerome, the King Dev. Co. has unwatered the 1888; two shifts are drifting east and west.——The Columbia Co. is drifting for the main ledge, which is expected to be cut at the 300-foot mark.——In Big Bug district, a blower will go in on the Cliff group.——Work on the Brookshire, Big Bug district, is resumed.

Work on the Leland group, in Chaparral district, near Prescott, will resume shortly.——At the Red Rock, at Big Bug, fifteen men are working.——The tunnel in the Little Kid, on Slate creek, near Prescott, is in 240 feet; Supt. A. J. Pickerell. —— Work is progressing at the Treasure Vault, near Jerome; M. Lawler, Supt.; shaft is down 117 feet; drift south is run 80 feet.——The Mingus M. Co. has put in a 40-ton hoist on the Mingus mountain property, 12 miles from Jerome.——Work on the Silver King, on Groom creek, near Prescott, will resume on the 15th inst.

Boring machinery is going in on property between Prescott and Jerome—drilling for oil.

YUMA COUNTY.

Work is in progress on the Desert Dwarf (gold), 6 miles from Welton; shaft is down 40 feet; vein at that depth shows 22 inches of hematite ore, running about $37 gold to the ton.

CALIFORNIA.

AMADOR COUNTY.

The case of the Keystone Con. M. Co. vs. the South Spring Hill M. Co. for alleged trespass of ground, which has been pending in the courts for several years, has been decided by the Superior Judge of Calaveras county in favor of the South Spring Hill Co.

Near Amador City the shaft on the Fremont, of the Fremont Con. group, is down 450 feet; a 25-foot ledge is opened up by a 120-foot crosscut; old shaft is being unwatered by a pump said to be the largest in use on the Mother Lode; it has a 22-inch cylinder, with 33-inch stroke; new 60-stamp mill will probably be completed by June; new men will be put on soon.——The Amador Improvement Co. expects to start up its plant at the Newton Copper mines soon, and it will probably employ eighty men; coke used in smelting ores at the mines comes principally from Australia, England and Georgia.

BUTTE COUNTY.

The Hesperian Crude Oil Co. is putting in its rig at Richardson's springs, and will begin boring for oil.

CALAVERAS COUNTY.

The Calaveras Ditch Co. of 11 and 13 William street, New York City, is incorporated under the laws of New Jersey; capital stock $2,000,000; 200,000 shares. The company proposes to take water from the Stanislaus river and sell it to the placer mines, first utilizing it in producing electric power for the quartz mines. "After the water has been delivered to the mines it will again be collected and used for irrigating," so the prospectus says, but they will have a happy time of it.

Near Murphys, the Sugar Pine mine, on San Domingo creek, will be worked by the bonders; Jos. McClay, manager. A mill is to be put up.

COLUSA COUNTY,

The well at Wilber springs, near Arbuckle, is reported to be daily producing 1500 gallons oil.

EL DORADO COUNTY.

The mill on the Hart Consolidated, south of Georgetown, is running.——A Huntington mill will go in at the Alpine.——A mill will probably go in on the California Jack, south of the Alpine.——An 8-foot ledge is reported at a depth of 100 feet in the old Burnham, ore assaying $50 to the ton.——Operations on the Gentle Annie, north of Placerville, are resumed; a three-compartment shaft is being sunk.——At the Shaw, near El Dorado, twenty-five men are employed; a new hoist is in and a 5-stamp mill will be in shortly; W. I. Smart Supt.——Rich ore is being taken out at the Mt. Pleasant, near Grizzly Flats.

KERN COUNTY.

W. H. H. Hart and others of San Francisco have acquired the whole of section 36, 28–28, near Bakersfield; two rigs will be put in and boring begun immediately.——The Minnehaha Oil Co. is preparing to sink six wells on its property, on 19, 28–28.——The Del Rey Oil Co., on 5, 29–28, has three strings of tools going.——The Acacia Oil Co., on 10, 29–28, is reported to have struck oil sand.——The Kern River Mutual Oil Co. will begin drilling on 4, 29–28, soon.——The Pittsburg Oil Co., operating in Sunset district, has recovered its tools and will probably go ahead with its work.——The Emperor Oil Co., newly incorporated, is drilling on 2, 11–24, near Sunset.——McIntosh & Gilfillan will organize companies to operate in the Temblor field.——C. A. Canfield will begin drilling for oil in the Midway district soon.——The Pacific Con. Oil Co. has struck a stratum of oil sand near Midway, 50 feet thick.——The Bay City Oil Co. has struck oil.——The Sunset Diamond Oil Co., on 13, 11–24, near Sunset, has its well down 750 feet; it is producing a good grade of oil; a new rig will be put in.

The Sunset Queen Oil Co. has begun drilling on 31, 32-24, near Sunset.——The well of the Chicago Crude Oil Co. is down 1250 feet.——The Sunset O. K. Oil Co. is putting in a rig.——No. 4 well of the Junction Oil Co., Bakersfield, is down 890 feet and is producing 520 barrels per day.——The Ila Oil Co., capital $500,000, is organized at McKittrick to work 320 acres of land near there.——The Maricopa Oil Co., capital $300,000, is incorporated at Bakersfield.——The Chicago Crude Oil Co. is building a 25,000-barrel concrete reservoir on the northwest corner of quarter 30, Bakersfield, and the Toltec Oil Co. will build one of the same capacity on the southeast quarter of 30. 28-28.——The Diamond Jubilee Oil Co., capital $250,000, is incorporated at Bakersfield.——Globe No. 4 well is now producing 125 barrels of oil per day.——The Virginia Oil Co. is putting in a second standard rig.——The McWhorter Refining Co.'s plant at Kern City is now running, turning out asphaltum and distillates.

The new 100-stamp mill going in on the Yellow Aster, at Randsburg, is expected to be crushing ore by the middle of March; it is estimated they will require only 1500 gallons of water daily, against 9000 gallons now used.

LOS ANGELES COUNTY.

The well of the Pacific King Oil Co., in the Newhall field, is down 1325 feet; boring is in progress.——The Whittier Grande Oil Co., operating in the Whittier field, is down 1000 feet.——The Pacific Slope Oil Co.'s well No. 5, Los Angeles, recently completed, is turning out about twenty-five barrels oil per day; No. 6 is down over 270 feet.——It is reported that the Santa Fe R. R. Co. has contracted for 750,000 barrels oil per year; the company is now using 30,000 barrels oil per month for fuel.——The Nueva Camulos Oil Co., operating on Western avenue, north of the Weid tract, Los Angeles, has completed one well which is producing twenty barrels oil per day; another well is being drilled.——Freeman & Nelson have struck another vein of white oil in their No. 3 well, at Placerita.——The Pioneer White Oil Co. is drilling at 900 feet——The well of the Iola Co. is down 1100 feet.——The Whittier Producers' Oil Co. is drilling a well near Puente; well is down 200 feet.——The well of the Western Star Oil & Coal Co., now down 750 feet, is expected to strike oil at a depth of 1100 feet.——No. 1 well of the Reliance Oil Co., at Ivanhoe, is down 800 feet; oil sand is expected at 1200 feet.

MARIPOSA COUNTY.

The shaft of the Merced at Coulterville is down over 900 feet. There is about 300 feet more to go.

NEVADA COUNTY.

The old hoisting plant at the Reward is being removed to the Mistletoe, near Rough and Ready; Supt. C. Graham.——At Grass Valley a new 5-stamp mill will go in on the Golden Gate; G. R. Tuttle, Supt.——The pump at the Diamond is running steadily; Supt. G. Murphy.

PLACER COUNTY.

The Azalea tunnel, at Blue Canyon, is in 2814 feet; an upraise is being run; Supt. T. Rodger.——At Dutch Flat the Rawhide Quartz M. Co., capital $50,000, is incorporated.

SANTA CLARA COUNTY.

Indications of a quicksilver mine have been found by the Silver Creek M. Co. 3 miles east of Evergreen. Cinnabar float has been found.

SHASTA COUNTY.

Herron & Leach have resumed operations on their property north of Mt. Shasta.——An exploration tunnel will be run on the Sally Ann group at Lower Springs.——Wise Brothers are shipping ore from their claim, near Lower Springs.——At Deadwood the Brown Bear mill is shut down, and a number of men are laid off; drifting in mine is in progress.——Owing to snow and bad state of the weather, the Luppin and Zent mines are shut down.

The Washington, Three Sisters and other adjoining properties, near French Gulch, will probably be consolidated and worked under one management. Work will begin about April 1.

SIERRA COUNTY.

The Rising Sun, at the mouth of Slug canyon, near Downieville, is sold to J. W. Finney, who recently bought the Telegraph, at Fur Cap, and who has men repairing the old tunnel; when repairs are completed, two shifts will be put on and tunnel will be extended.

SISKIYOU COUNTY.

S. Seliski, operating near Graham gulch, on South Fork of the Salmon river, from a pocket of ore recently obtained $7000.——Clute & Cleland will soon begin operations on Humbug creek.

Work is under way at the Fernandez hydraulic mine, on Cherry creek, near Yreka.——At the Cherry Hill (quartz), on same creek, considerable ore is on hand waiting for the mill to start up.——It is said that all ore shipped from the Dewey, 6 miles west of Gazelle, averaged $35 to the ton; work on the 10-stamp mill has been delayed recently by stormy weather.——The Gold Run, on Knownothing creek, near Yreka, is running steadily; A. Dannenbrink, Supt. A 10-stamp mill is on the property.——Work will soon be started on the Oro Fino and Mugginsville hydraulic claim.

TULARE COUNTY.

The La Mesa Chiquita Oil Co., capital $200,000, is incorporated at Porterville to work oil lands in township 25, range 28, north of the Kern river oil district.

TUOLUMNE COUNTY.

J. Hamilton is working his property between the Providence and Starr King mines, near Carters.——Ten additional stamps are going in in the mill of the Black Oak; good ore is being mined.——Sinking is in progress at the Poison Oak, near Soulsbyville.——Thomas & Phillips will sink a shaft near the Poison Oak.——At the Jeremiah, near the confluence of the North Fork and main Tuolumne river, near Carters, work is being pushed in the lower tunnel; the vein is 4 feet wide.——The main working shaft at the Seminole, now idle, is down 336 feet at an angle of 45°; it is 5x8 feet in the clear, 12x12 timbers. A drain tunnel is run 85 feet below the bottom of the shaft.

COLORADO.

CHAFFEE COUNTY.

The Stockton tunnel at Cleora is sold to Michigan men. One hundred feet of tunnel is run and an additional 100 feet will be driven.

CLEAR CREEK COUNTY.

The shaft on the P. T. of the Stanley Con. is down 266 feet; 600 feet of laterals are run. A new plant is to go in. An additional 400 feet will be sunk.——The following table will show the stamp and concentrating mills in operation at Idaho Springs, with daily capacities of each:

Mill.	Kind.	Tons.
Newton....	Concentrating	80
Roberts....	"	80
Smith	"	50
Donaldson..	"	80
Stanley....	"	50
Allan.....	"	80
Mixell.....	Stamp	30
Anderson..	"	20
Wilkie.....	"	30
Total.....		500

Connors & Co. are driving a level on the Mineral Chief, Idaho Springs.——Half the stations on the Red Oak tramway are completed.——Work is begun on the Buckeye State, on Democratic mountain. The lower level will be driven ahead.——The Kaverne M. & M. Co., capital $500,000, and the Alpha G. & S. M. Co., capital $50,000, are incorporated at Idaho Springs.——Two tunnels, 200 feet apart, are run on the Maud S., near Empire.——The shaft on the Gold Fissure is down 165 feet. Stations are cut and levels started in both directions. Two shifts are working.

EL PASO COUNTY.

A one-fourth interest in the C. H. M., Woodland Park district, is sold to F. Bronk for $2500.

The Galena & Beacon Con. G. M. Co., capital $1,500,000, is incorporated at Colorado Springs.

FREMONT COUNTY.

The pyritic smelter at Florence is running smoothly.

GILPIN COUNTY.

A new Cornish pump is to go in on the Gregory-Buell (consolidated) at Central City.——The shaft on the East Whiting, Central City, is down 440 feet. The mine is connected with the Gilpin County Tramway Co.'s line, over which the ore is carried to Black Hawk stamp mills and sampling works.——R. C. Miller of Chicago, Ill., operating the Gundy, in Chase gulch, near Central City, has men sinking a shaft, now down 105 feet, to the 165-foot level.——A strike of copper ore is made on the 150-foot east level of the Powers, in Willis gulch, near Russell.

Ore netting $40 to the ton is being taken from the 300-foot level of the Washington Extension, in Lake district.——The Justice, in same district, is being operated by the New Haven & Denver M. Co.; twenty men are working; Manager F. Goldsmith.——Moody & Co., leasing the Baldwin, in lower Russell district, are taking out good ore at a depth of 50 feet.——The Maume Tun. & Leas. Co. are running a tunnel from Russell gulch to Willis gulch; it is now in 700 feet.——The shaft on the British, in Illinois-Central district, near Central City, is down 220 feet; Manager H. M. Cowell; a good streak of lead ore is opened up in the 200-foot level.——During January 288 cars, or 5328 tons, of smelting and crude ore were shipped from Black Hawk.——A new 24x45-foot shaft house is completed on the Bonnie Belle, on Colorado hill, near Pine Creek.

GUNNISON COUNTY.

The coal mines of the county are running; the Alpine and Black Diamond, at Baldwin, are producing 400 tons coal daily; the Colorado Fuel & Iron Co., at Crested Butte, is shipping nearly 100 carloads of hard and soft coal and coke daily.

H. B. Gillespie of Denver has organized a party of twenty prospectors to explore and prospect near Taylor park, at the head of Taylor river.

HINSDALE COUNTY.

The tunnel on the Golden Fleece, near Lake City, is in 2000 feet.——New hoisting machinery is going in on the Hiawasse.——At the General Sherman a new hoist is going in.

JEFFERSON COUNTY.

Work on the buildings for the new pyritic smelter of the Clear Creek Ore Reduction Co. at Golden is begun. The furnace will have a daily capacity of 100 tons of ore.

LAKE COUNTY.

Sinking pumps are in on the Bon Air, Leadville, and the sinking of another 100 feet is in progress.——The shaft on the Nisi Prius, Leadville, is down 700 feet; Manager S. J. Sullivan.

LAS ANIMAS COUNTY.

The output of coal of the mines of the county for 1900 was 2,205,814 tons.——The Colorado & Southern Railroad Co. is building a branch road from Trinidad up the Las Animas river to the Stonewall region. It will tap

large coal and stone deposits which the Colorado Fuel & Iron Co. and Boston men are preparing to open up.——The population of the county, as given by the last census, is 21,842, of which 5345 are credited to Trinidad.

OURAY COUNTY.

Ore running from 400 to 1000 ounces to the ton is reported opened in the old crosscut in the Governor, near Ouray.

At the Camp Bird Extension, near Ouray, the adit level has opened up ore, at a depth of 40 feet, running from $30 to $35 to the ton.

SAGUACHE COUNTY.

The new railroad between Moffat and Crestone is expected to be completed by May 1.

SAN JUAN COUNTY.

The Notaway G. & C. M. Co., operating on Sultan mountain, near Silverton, will work electric drills, power being generated by a 5 H. P. gasoline engine.——The Almira M. Co. will run an 8x8-foot crosscut tunnel to tap the Silver Ledge at great depth. A new 100-ton concentrator is also contemplated.——Work on the Daniel Webster, in Prospect basin, near Silverton, is progressing favorably. Nine men are employed.——A 90 H. P., 16-drill air compressor will go in near the Natalie to develop it and the Occidental.——The Emma tunnel, on Galena mountain, is going in at a good rate. After May 1 it is probable that electric or air drills will be used.——Dennison, Eben and others of Denver, owning the Pride of the West, will probably put in a plant on the property soon, and push work on an extensive scale.

SAN MIGUEL COUNTY.

The following table shows mineral output of mines of the county for the year 1900:

Mine—	Gold.	Silver.	Lead.
Smug'r-Union.	$533,000	$267,000	.....
Tom Boy.....	527,400	18,600	40,000
Liberty Bell...	200,000	100,000	.....
Ophir Tunnel.	75,000	37,500	37,500
Japan	56,450	25,000	36,000
Gold King.....	125,000	.....	.....
Butterfly.....	70,000	7,000	.....
Carribeau.....	60,000	20,000	.....
Alta	10,000	50,000	25,000
Palmyra.	10,000	10,000	10,000
Keyst'e Placer.	25,000	.....	.....
Suffolk.....	30,000	.....	.....
Bessie.....	25,000	.....	.....
Miscellaneous .	20,000	30,000	.....
Total....	$1,766,850	$565,100	$148,500
Copper			$15,000

During 1900, 461 cars of ore were shipped from the mines of Ophir district. Regarding Ophir mines, there are thirteen levels run in the Carribeau group, running from 800 to 1500 feet in length. Twenty-five men are employed in mines and mill.——On the Montezuma a 500-foot drift east and a 400-foot drift west are being run.——On the Little Eva a 500-foot crosscut and a 180-foot drift are run.——A 180-foot tunnel is run on the Merrimac, opening up an 18-inch vein.——Operations on the Carbonero are going ahead satisfactorily; two tunnels are run, the upper one being 200 feet long and the other 150 feet long; a shipment of ore was recently made to the smelter at Durango.——The tunnel on the Deadwood–Nevada is now in about 1200 feet; an electric drill will soon be in place. It is said that, upon completion of the tunnel, a mill will be put in; G. R. Dolf, manager.——During 1900 the Suffolk mill treated 1907 tons of ore from the Suffolk and 111 tons of custom ore.——On the Shoemaker a 150-foot crosscut and a 500-foot drift are run; ore treated at the Suffolk mill averaged $20 to the ton.——A 220-foot tunnel is driven on the Sink-to-Rise; owners, Dinan & Prim.——Brink & Merrill, operating the Gertrude, Ophir, contemplate putting in a 30-stamp mill in the spring.——A 420-foot crosscut is run on the Staatsburg.——A vein of ore running from 2 to 4 feet in width is opened up in the 1500-foot tunnel of the American–Frenchman, on the north slope of Yellow mountain, near Ophir.——A 150-foot crosscut is driven on the North Star.——The tunnel on the Parsons, bonded to Bradley, Bell and others, is about 600 feet long.

TELLER COUNTY.

A strike is reported on the 263-foot level of the Red Umbrella, on Raven hill, at Cripple Creek, at a point 80 feet from the shaft.——On the Climax crosscutting is under way on the 300-foot level. The tunnel is in about 700 feet.——The Maud Helena, on Bull cliff, is shipping ore. Wood is now used as fuel, the coal supply having given out owing to the strike.——The double-compartment shaft on the Last Dollar, on Bull hill, is down 1050 feet and a station is cut at that level. Sinking will be continued.——Lessee Wrockloff, operating the Burns, is drifting on the 625-foot level. A room is being cut in the third level for a windlass to operate in the winze now being sunk from that level.——The shaft on the Zoe is down 330 feet.——The steam hoisting plant on the Minna S. is replaced with a gasoline hoist. Good ore is being mined on the 300-foot level. The shaft will go to the 350-foot level.——High-grade ore is being taken out from the 700-foot level of the Golden Cycle. The company contemplates shipping 100 tons of ore daily.——The El Paso vein is opened up in a crosscut on the 350-foot level of the Cripple Creek–Columbia.——Higher grade ore is opened up by a drift on the 600-foot level of the Santa Rita.——Seventy-five tons of ore are being shipped from the 500-foot level of the Mary McKinney. Pumps are raising 900 gallons of water per minute from the 500-foot level.——The Challenge G. M. Co., capital $150,000, is being organized at Cripple Creek.——The Bostwick G. M. Co., capital $150,000, is incorporated at Cripple Creek.

The capacity of the Economic mill at Cripple Creek will be increased to handle 1000 tons of ore per month.——On the Little Fauntleroy, on Gold hill, Cripple Creek, a new shaft will be sunk.

The Lucky Guss, Victor, will be worked through the John A. Logan.——A new hoist is going in on the Dillon, and sinking will begin.——Sinking and drifting are in progress at the John A. Logan; a drift is being run to connect with the Orpha May.——At the Orphan Belle, on Bull hill, near Altman, an engine and shaft house are going in on the new shaft; machinery from the old shaft will go in. The plant consists of 10x14 hoist, a two-drill compressor and two 70 H. P. boilers——Sinking is under way on the Hallie E., at Cripple Creek; a station is cut at the 50-foot level. A 15 H. P. electric hoist will go in as soon as the Colorado Electric Power Co. completes its lines to Galena hill; J. H. White, lessee.——A crosscut is being run on the 950-foot level of the Independence Con.——The King lease, on the south end of the Last Dollar, shipped 225 tons of 5½-ounce ore during January.——The Winners Leasing Co., operating the Monument, on Battle mountain, have completed development on the 200 and 300 foot levels; three machine drills are working.——Ore is opened up at a depth of 60 feet in the Mary Ann, on Raven hill; the vein is 3 feet wide, and assays are said to run from $15 to $90 gold to the ton.——The Bonzai Co. has patents for the Silver Spring, Grubstake, Spotted Calf and Old Ironsides, on Squaw mountain, consisting of 17½ acres.——On the Zoe the shaft is down 320 feet, and the vein at that depth is 9 feet wide.

The shaft on the Lillie, Cripple Creek, is down 1300 feet; water from the mine will be lifted by the Vindicator pumps; sixty tons ore per week are produced, mainly from 800-foot level.——A strike is reported at the Rag, ore running $40 to the ton.——From 12 to 15 feet per day are being made in the Ophelia tunnel.——Ore recently struck on the 525-foot level of the Pointer is said to be running $100 to the ton.

GEORGIA.

HALL COUNTY.

River and bank dredging is being successfully carried on near Gainesville. The four dredgers are all of the dipper type. The one now being run by E. McDowell is stated to have produced about $120,000 in three years, on expenses of about $12,000.

IDAHO.

BOISE COUNTY.

On the Middleman, at Pearl, sinking is in progress; twelve men are employed.

SHOSHONE COUNTY.

The Hunter Creek M. Co., Ltd., capital $1,000,000, is incorporated at Wallace to work the Belmont and Union claims, near Mullan. A tunnel will be run on the Belmont.

It is reported that the Buffalo Hump M. Co. has sold the Tiger–Poorman, on Canyon creek, near Burke, to the Idaho–State M. & D. Co. for $1,000,000.

MONTANA.

BEAVERHEAD COUNTY.

In Grasshopper creek, near Bannack, the Montana Gold Dredging Co., headquarters at Monmouth, N. J., states its capital stock is $100,000—$63,000 issued and paid in cash; assets, $121,140; liabilities, mortgage bonds, $30,000; bills payable, $14,371.65; unpaid accounts, $13,768.40. The company has not operated its boat this season, as it was closed down under attachment proceedings at the close of the season of 1900. Work has not been resumed.

B. F. White has been appointed local agent for the Montana Copper & Gold M. Co., a new corporation, to develop the Manser copper mines on Stone creek, 12 miles east of Dillon. The company is organized under the laws of Wyoming, capital stock $1,000,000.

J. J. Cuseck states that work on the Polaris, 40 miles from Dillon, will be pushed in the spring, and that new machinery will go in.

CASCADE COUNTY.

On account of trouble with its water power at Great Falls, the Boston & Montana Co. will put in auxiliary steam power—two plants—one 1500 H. P., another 1000 H. P. The power recently fell off so much that the refinery was closed down for a while and only 1000 tons of ore was smelted daily; the usual amount handled is 3000 tons; Manager Klepetko.

DAWSON COUNTY.

A rich pay chute is opened up on the Uncle Sam, on Elk creek, near Wibaux.

DEER LODGE COUNTY.

General Supt. Brunton is introducing in the Anaconda mines the cave system of stoping ore, designed to economize the use of timber.

SILVER BOW COUNTY.

Two sales of portions of the Minnie Healy, at Butte, are reported made to the Boston & Montana M. Co., one being for $132,250 and the other $8725 for a one-twentieth interest.

The Governor has signed the eight-hour law for miners and smelters. It goes into effect May 1, 1901.

NEVADA.

ELKO COUNTY.

Work on the Young America, at Tuscarora, will resume soon; a winze will be sunk from the 125-foot level.

ESMERALDA COUNTY.

Fish & Wichman have leased the Wheeler, at Pine Grove.

EUREKA COUNTY.

Returns from a car of ore recently shipped from the Rocco–Homestake, at Eureka, to Denver, Colo., show ninety-five ounces silver and 30% lead to the ton.

LINCOLN COUNTY.

At the Abe Lincoln group, near Pioche, a stamp mill and concentrator are going in; plant will cost $25,000.

Manager Healey of the April Fool, at De Lamar, says that the mill, which includes a cyanide plant as well as stamps, will be enlarged.

The eight-hour law, regulating miners, mill workers and all reduction plants, has passed the Assembly. The bill was introduced by Burke from De Lamar, where miners are working twelve hours.

STOREY COUNTY.

The main south drift from the Gould & Curry tunnel on 450-foot level is run 386 feet; two crosscuts are being run—No. 1 east and No. 2 west.

On the 900-foot level of the Caledonia, Virginia, No. 2 crosscut is in 48 feet; on the 1000-foot level the northwest drift from the north drift is in 117 feet.——Ten cars of ore recently shipped from the 900-foot level of the Overman returned $22.51 per ton, $13.76 being gold.——The Bowie claims at Virginia are reported sold for $3000.

During week ending Feb. 2d, four cars of ore, or 295,050 pounds (railroad weight), running about $7216 to the ton, were shipped from the Consolidated California & Virginia, at Virginia, to the Selby Smelting & Lead Works, San Francisco.——The west drift in the Burning Moscow is retimbered; west drift on 56-foot level of Central tunnel of the Ophir is run 295 feet.——No. 2 crosscut on Central tunnel level of the Mexican is in 291 feet.——The Hale & Norcross tunnel is now in 2003 feet.——At the Sierra Nevada, the west drift on the 1600-foot level is cleaned out and repaired for a distance of 960 feet from shaft.——At the Potosi, the north drift on the 80-foot level of the Greek shaft is in 242 feet.——The northwest drift in the Silver Hill is run 177 feet. —— At the Gould & Curry stoping is in progress on first, second, third and fourth floors of the 325-foot level.——The west drift from crosscut No. 9 on the Best & Belcher is in 51 feet.——Surface tunnel No. 2 of the Utah is in 854 feet.

WASHOE COUNTY.

A double-compartment shaft will be sunk on the Star, near Reno.——In the suit of C. Bell vs. G. Wedekind, decision is rendered in favor of the latter.

A recent crushing at the Slip mill of forty-four tons of ore from the Gold Ledge, near Olinghouse, returned a bar of gold weighing 129.19 ounces, which netted $1935.85; it is said that W. C. Williams, operating the Gold Ledge, has taken out $40,000 in the last ten months, working eight men.

NEW MEXICO.

BERNALILLO COUNTY.

The new Woodbury mill at Bland is about completed.——The Star mill will probably go in this year.——Operations are under way at the Albemarle mill.——A new smelter is going in at Algodones.

COLFAX COUNTY.

The Aztec, in Cimarron district, near Elizabethtown, has produced over $1,000,000 in gold.——A Chicago company is building a dredger on the Moreno placers; a ditch 42 miles long brings water from Red river to the placers.

DONA ANA COUNTY.

The New Mexico Lead Co. is building works near San Andreas.

GRANT COUNTY.

Good progress is being made on the new mill at Deming.——The Mineral Point Zinc Co. is shipping zinc ore from its properties near Fierro.

The Clifton Copper Co., capital $500,000, is incorporated to work the mines near San Jose.——The shaft on the Gillett, at Pinos Altos, is making good progress; it will go to the 1000-foot level.——Operations on the Golden Giant and Mammoth are temporarily suspended.——High-grade ore is being prepared for shipment at the Mountain Key; W. C. Chandler, Supt.——F. J. Davidson & Co. are working the Arizona.

LINCOLN COUNTY.

The Old Abe, at White Oaks, is producing good ore from the 1000-foot level.——The Jicarillo placers have passed into the hands of the American Placer Co.; new machinery is going in.——The Bethlehem Iron Co. will put in new machinery on its coal property near Nogal.

RIO ARRIBA COUNTY.

St. Louis and Kansas City, Mo., men are working the Chama placers, which are estimated to hold $10,000,000 in gold. Gold is found intimately associated with black sand, and a smelter to treat the latter will probably be put in this year.

SANTA FE COUNTY.

The Cerrillos smelter will probably resume operations this month.——At Madrid the Cochiti mines are using electric light and power.——The 350-ton smelter at San Pedro is running.——Near Golden the new Woodbury mill is completed.——The Madrid coal mines are sold to the Colorado Fuel & Iron Co., and the O'Mara coal mine is sold to the Santa Fe G. & C. Co.; both companies will put in new machinery.——The Galisteo Co. has an experimental mill, using the Edison process, in operation on the Ortiz. The new Edison plant will cover several acres of ground and will be capable of handling 32,000 tons of gravel daily.

SIERRA COUNTY.

A. Walker has bought a five-sixths interest in the Ashville, near Grafton; it is reported that he has also bought the Alaska and Montezuma mines and a claim of the McDonald group.

TAOS COUNTY.

The Copper Hill M. Co., operating copper mines at Rinconada, has its 100-ton concentrator running at that point; seventy-five men are employed in mines and mill.——The Rio Hondo Copper Co. is preparing to put in large copper reduction works at Amizett; a tramway is in, and the tunnel is run 450 feet; thirty men are employed.——At Red River the June Bug mill is completed.

SOUTH DAKOTA.

LAWRENCE COUNTY.

The Pluma M. Co. has men sinking a shaft on the Tenbrook, near Pluma; W. A. McCain, general manager.——The Gopher M. Co. of Minneapolis, Minn., has put in a new gasoline hoisting plant on the Lena, 4 miles north of Hill City; the shaft will go down several hundred feet.——The Belt Dev. Co. of Colorado Springs, Colo., will sink a 600-foot shaft; the latter will be three-compartment to a depth of 100 feet, and for the balance of 500 feet it will be two-compartment.——The National M. & S. Co. of Maine will probably put in a 500-ton smelter on the Bullion, in Bear Butte district, east of Deadwood.——The twenty-ton cyanide plant at Ragged Top, recently destroyed by fire, will be replaced by one of larger capacity.——The crosscut tunnel being run by the American M. Co. is in 500 feet.

OREGON.

BAKER COUNTY.

A 20-stamp mill is to be built on the Alamo mine, Sumpter; J. C. McGuigan, Supt.

The Golconda at Baker City is reported bonded to C. A. Smith of Pittsburg, Pa., who represents the syndicate which will probably buy the property. Mr. Smith is president and general manager and will put on men.——The final payment of $20,000 is made on the Iron Dyke (copper), on Snake river, near Ballard's Landing.

JOSEPHINE COUNTY.

Piping is temporarily suspended at the Davis (hydraulic), in Jump-off-Joe district, near Grant's Pass, owing to cold weather.

JACKSON COUNTY.

The mill at the Ashland, near Ashland, is enlarged. Ten stamps are now dropping on ore from the Ashland.——Twenty tons of ore recently shipped from the

Columbia, near Sumpter, to the sampler at Baker City gave returns of $50,000.——After sampling the ore was sent to the Everett, Wash., smelter.

LAKE COUNTY.

Near Warner lake, 125 miles south of Burns, deposits of nearly pure borax are found. A plant is in on the property; the product is hauled in wagons to Winnemucca, Nev., a distance of 125 miles, where it is shipped to market.

UTAH.

CARBON COUNTY.

The first carload of hard coal from a Utah mine was marketed in Salt Lake on the 30th ult. from the Castle Valley, 9 miles north of Price; Milner & Gilson, owners; deposit was found fifteen years ago, but development done recently; a 250-foot drift is run; buildings are up, tracks laid and shipments will be made regularly; vein is 5 feet 4 inches thick.

A carload of elaterite was recently shipped East from the mine of J. A. Curtis, at Soldier Summit, operated under bond by G. F. Tims, of Washington, D. C., and T. B. Beatty, of Salt Lake.

JUAB COUNTY.

An assessment of 1 cent per share is levied by the Martha Washington M. Co., Tintic.——The new May Day mill is expected to be in operation within thirty days.——The shaft on the Black Jack & Trail, Tintic, now down 400 feet, will go to the 1000-foot level.——Five cars of ore recently shipped from the Lower Mammoth, at Tintic, netted $5125; three of the cars yielded ninety-two ounces silver and 10.8% copper to the ton, while the other two cars ran 92 ounces silver to the ton.

PIUTE COUNTY.

The crosscut on the 300-foot level of the Park G. M. Co.'s property, at Marysvale, in 70 feet, has opened up good ore; General Manager Gibbs.

SALT LAKE COUNTY.

The tunnel on the Julia S. group, near Bingham, now in 300 feet, will be run an additional 300 feet.——Ore from a recent strike made in the tunnel of the Ben Butler assays 30% lead, 126 ounces silver and about 60 cents gold to the ton; Supt. McQueen.

The new smelter of the Bingham C. & G. M. Co., at Bingham Junction, was started on the 31st ult.——More men are put on at the Dewey tunnel, in Big Cottonwood canyon.——The cyanide plant at the Overland, Bingham, recently enlarged, has a tank capacity of 1900 tons, and is capable of handling 500 tons of ore daily.

SUMMIT COUNTY.

The Quincy, at Park City, is shipping eight wagonloads of ore to the Mackintosh sampler daily.——Another carload of machinery for the new Silver King plant is received; construction work is progressing favorably.

The deal for the sale of the West Ontario group, at Park City, is about completed.——An assessment of 2 cents per share is levied by the Creole M. Co.——The tunnel on the Wasatch is in 380 feet.——Supt. Sutton of the Constellation is drifting south on the vein.

TOOELE COUNTY.

A new plant, including a 25 H. P. boiler, a 6x8-foot engine and hoist, and a Leyner compressor and drill, tanks, etc., are going in on the Stockton, at Stockton, operated by the Stockton G. M. & M. Co.; a concentrator will probably go in this spring.——Work is started on the Pelican, near Stockton.——Drifting is under way in the main tunnel of the Honerine, at Stockton, 100 feet below the old workings.

UTAH COUNTY.

A strike of "anthracite" coal is reported in the tunnel of the Provo Anthracite Coal Co.'s property, in Rock Canyon, 8 miles northeast of Provo; tunnel is in over 1500 feet.

WASHINGTON COUNTY.

W. F. Snyder has bought a one-sixth interest in the Dixie, at Saint George, for $5000.

WYOMING.

CARBON COUNTY.

The shaft on the Ferris-Haggerty, at Grand Encampment, is down 300 feet.——New machinery, including hoist and pumps, will go in on the Rambler (better known as the Doane); a double quadruple shaft will be sunk.——The Kurtz-Chatterton C. M. Co. is sacking and piling up concentrates for treatment at the new smelter, now being built at Grand Encampment.——The shaft on the Great Lakes is down 300 feet; 120 feet of crosscuts are run.——The Hercules shaft is down 200 feet.——The shaft on the Dewey, of the Union C. M. Co., now down 65 feet, will be sunk an additional 500 feet.

LARAMIE COUNTY.

During the year 1900 the iron mines at Hartville produced 1000 tons of ore daily; the output was used at the Pueblo, Colo., smelter of the Colorado Fuel & Iron Co.——It is said that the Union Pacific R. R. Co. will build an iron foundry and blast furnaces at Cheyenne and that the Burlington R. R. Co. will build iron and steel works at Guernsey.

WASHINGTON.

OKANOGAN COUNTY.

The Okanogan Free G. M. Co. of Oroville is reorganized in Minneapolis, Minn., under the name of the Golden King M. Co.

On the Bonnie Lassie group, one-half mile east of Loomis, the tunnel is in 65 feet.——The Q. S. tunnel is in 560 feet.——At the Carbon, 5 miles north of Loomis, near Palmer lake, work in the tunnel is progressing.—— Operations on the Ella group, near Golden, are resumed.——At the Golden Zone, one of the mills is running; the other will start up shortly; the crosscut tunnel being run, now in 300 feet, will be driven to the 1000-foot mark.——An air receiver is going in at the Puritan mines, on Gold Hill; the compressor will be placed on Toats Coulee creek near mouth of the 5000-foot tunnel, and air will be forced up to workings on top of hill, a mile and a half distant.

STEVENS COUNTY.

A new company is incorporated at Colville to work the Nevada, Big Stocks and Fresno claims, 10 miles east of Boundary.——Good progress is being made in the long crosscut of the Bear Mountain M. & D. Co., near Colville.

FOREIGN.

BRITISH COLUMBIA.

At the annual meeting of the Knob Hill M. Co. of Rossland, President Miner reported that an agreement had been reached between the directors of the Knob Hill, Ironsides, Gray Eagle and Granby Smelter companies to combine. The plan is to form a new company under the name of the Granby Consolidated Smelting & Mining Co., Ltd., with a capital of $15,000,000, of which $2,000,000 is to be held as treasury stock.

The benches on Pine creek, near Pine City, Atlin district, are being worked this winter; considerable gravel is being piled for sluicing in the spring.——The Nimrod Co. has its stamp mill on Monro mountain, near Atlin, running.——The Columbian M. Co. has bought a group of claims on Spruce creek, near Atlin, for $20,000; a hydraulic plant will be put in.

The new forty-drill air compressor for the Rossland-Great Western at Rossland is expected to be on the ground by the 11th; the plant will be run by electric power. The new intercooler for the new compressor differs from those now in use, it being cylindrical. A new compressor is expected to be in place next month.——Good progress is being made in running the tunnel from the Gopher into the Homestake; the ledge was recently struck at a point 150 feet from the shaft.——During December the eighty stamps at the Ymir mines, at Ymir, ran 611 hours (25 days 11 hours); the estimated profit was $23,600.——The main tunnel in the Queen Bess is in 1665 feet.——Five feet of copper-gold ore is struck by the diamond drill on the 300-foot level on Green mountain.

The new air compressor for the Rossland Great Western, at Rossland, has compound or two-stage air cylinders 36 inches and 22 inches in diameter, with 42-inch stroke; compressor will be driven by an electric motor through the medium of a rope drive; drive wheel is 18 feet in diameter, with 51-inch face, grooved for twenty-two ropes 1½ inches in diameter; wheel is made in halves, has a double set of arms and weighs 40,000 pounds; low-pressure air cylinder has Corliss air valves driven by special valve gear; intercooler is of most recent water tube type; machine complete weighs 150,000 pounds.

At Rossland a strike is made at the Green Mountain on the 300-foot level; ledge is 5 feet wide.

The Galore, Emma Fraction, Santa Rosa, Hidden Hand, Last Edition, Myrtle Fraction, Jew Fraction, Mac and Violet claims, near Fort Steele, are reported bonded to the Fort Steele Development Syndicate for $45,000.

NOVA SCOTIA.

The gold output for 1900 is given at 31,110 ounces. During the same period the production of iron ore was about 16,000 tons, which came from the mines of the Nova Scotia Steel Co. at Bridgeville.——At Picton the furnace of the Copper Crown Co. is running.——The 1900 output of the Barytes, at Cape Rouge, Inverness county, was 783 tons of ore.

ONTARIO.

One thousand tons of ore from the Wendigo, Lake of the Woods district, recently put through the Keewatin reduction works at Keewatin returned an average of $4 per ton. The cost of mining, shipping and milling was $2.07.——Reports from the Sultana, on Shoal lake, state that rich ore is being taken out from the new workings on the Crown Reef. The ore is said to mill an average of $40 per ton.——The mill at the Hammond Reef, in Seine River district, is now operated by electric power, the same being generated from a plant 4 miles from the mill. Forty stamps are dropping. The cost of mining and milling the ore at the mine is said to be a little over 90 cents per ton.——The Gold Panner, Lake of the Woods district, will resume operations March 1.——The Ontario Government now furnishes diamond drills for the use of mining operators in the province.——The Bullion No. 2, near the Mikado, on Shoal lake, is reported sold to Major Motley.——The Boulder M. Co. will cut 1000 cords of wood to continue operations through the winter.——A diamond drill is in at the Mikado.——Ore from the Sultana is said to be giving $11 in gold on the plates.

A new plant is going in at the Rock Lake, 12 miles north of Bruce mines.——The reduction works of the Ottawa G. M. & M. Co., at Keewatin, recently crushed 925 tons of ore from the Sakoose, Lake of the Woods district, returns from which were $10,060.98.

SOUTH AFRICA.

A report from Cape Town states that the Boer attack on the Boksburg mines resulted in damages amounting to £300,000 ($1,459,950).

TASMANIA.

During the six months ending Sept. 30, 1900, 167,221 tons of ore were smelted at the works of the Mt. Lyall M. & R. Co., yielding an average of 2.82% copper, 1.98 ounces silver and .07 ounces (about $1.34) gold per ton.

Personal.

S. T. GODBE, of Pioche, Nev., is in Salt Lake, Utah.

F. B. COOK of Salt Lake, Utah, is in southern Idaho.

D. W. RECKHART is president Superior mine, Lordsburg, N. M.

H. MCCORNICK AND L. BROWN, of Salt Lake, Utah, are in Oroville, Cal.

F. REID, manager Doric M. Co., Idaho Springs, Colo., has gone to England.

F. L. BATES succeeds R. C. Esson as master mechanic S. P. Co. at Newark, Cal.

J. B. SHAW is elected Sec'y Scorpion M. Co., Reno, Nev., vice G. R. Spinney, deceased.

WM. P. MILLER is appointed consulting engineer Republican M. Co., Jacksonville, Cal.

J. P. KERIN of Denver, Colo., is appointed State agent Triumph G. M. Co. at that point.

C. W. POPE of San Francisco, second vice-president Shasta Con. Oil Co., is in Redding, Cal.

J. SCHOENFELT, Pres. Mountain Lily M. Co., has returned to San Francisco from Columbia, Cal.

E. M. BIND, E. M., of San Francisco, is in Durango, Mexico, examining mining properties. He will return April 10.

EX-GOV. J. E. RICKARDS of Montana, chairman board of trustees Montana School of Mines, is in Salt Lake City, Utah.

R. A. THOMAS, Pres. Black Hills Cop. Co. and of the Mingus Mountain M. Co., has returned to Los Angeles, Cal., from Prescott, Ariz.

D. L. GREGG, former manager Ingersoll-Sergeant Drill Co., at Salt Lake, Utah, has resigned. He is now assistant manager of the Mine & Smelter Supply Co. at that point.

S. W. ECCLES, late traffic manager of the Oregon Short Line, has been appointed traffic manager of the American Smelting & Refining Co. at a salary of $20,000 per annum, with headquarters in New York. Mr. Eccles has resigned his present position, to take effect Feb. 15.

P. M. DE LEON, U. S. Consul to Guayaquil, Ecuador, S. A., is in San Francisco. He says that last December "a syndicate of English and American miners, largely interested in the Transvaal, secured all the mining rights to the entire State of Ecuador for a term of fifty years," and that "for these rights the Government will receive a heavy dividend."

Recently Declared Mining Dividends.

	Payable.
Bunker Hill & Sullivan M. & C. Co., Idaho, $21,000	Feb. 4
Swansea M. Co., Utah, 5 cents per share, $5000	Feb. 9
Silver King M. Co., Utah, 66⅔ cents per share, $100,000	Feb. 10
Empire State Idaho M. & D. Co., monthly 1%	Feb. 15
Daly-West M. Co., Utah, 30 cents per share, $45,000	Feb. 15

Commercial Paragraphs.

THE U. S. Navy Yard, Bremerton, Washington, was recently equipped with Cross oil filters by the Burt Mfg. Co. of Akron, Ohio.

FIVE 35,000-barrel storage tanks are being erected in the Bakersfield, Cal., district for the Standard Oil Co. and others by the Lacy Mfg. Co., Los Angeles, Cal.

THE Baker Iron Works, Los Angeles, Cal., has added the manufacture of steam engines of the simple horizontal type, adapted for the drilling trade. They have put in an electric crane, steam hammers, lathes and milling machines.

HENDRIE & BOLTHOFF MFG. & SUPPLY CO., of Denver, have sold two Witte gasoline hoisting engines, of 40 H. P. each, for the Crown Point & Virginia mine at Idaho Springs, Colo. These engines supplant a large steam hoist and will be installed within a month.

THE Risdon Iron Works of San Francisco has shipped a dredging outfit to the Birrim Valley Gold Mining & Dredging Co., on the African gold coast, including a ladder dredger, thirty dredger buckets, eight stone buckets, boiler, engine, electric light engine and dynamo—in all 690 packages.

JOHN WIGMORE SONS CO. recently shipped to Bisbee, Ariz., a specially built steam hoist and a 70 H. P. boiler for the Bisbee West Copper M. Co. The iron work for a 15-stamp mill, recently shipped for the Joseph Wharton property at El Dorado Canyon, Nev., was also from the Wigmore Works.

THE Pacific Coast Mfg. Co., a corporation capitalized at $100,000, has recently purchased the merchandise, agencies and leases of the Boothe Mfg. Co., Los Angeles, Cal. The general manager of the new concern, also its vice-president, is J. A. Haskett, for sixteen years identified with the Kansas City house of Fairbanks, Morse & Co. Valentine Peyton, former owner of the Mt. Lowe, Cal., Railway, is president and A. L. Hawes of Los Angeles is secretary.

THE Edw. P. Allis Co., through its Spokane, Wash., office, has an order from the Northport M. & S. Co. of Northport, Wash., for one Holthoff-Wethey double-deck matte calcining furnace, each hearth being 10 feet wide and 100 feet long—the third furnace they have installed at this plant, the other two being single-deck, 10x100 feet each. The Spokane agency also has an order for two large blast furnaces, size 44x160 inches at tuyeres from the Montana Ore Purchasing Co., Butte.

A SUCCESSFUL electric rock drill has been constructed and the Gardner electric drill is demonstrating its practicability. This drill was placed upon the market almost a year ago and has passed through the experimental stage. A number of them have already been purchased and are stated to be operating successfully, offering many attractions in the economy of installation and operation. A number of them are now used on the Pacific coast. The California Electrical Works, 409 Market St., San Francisco, have recently taken up the manufacture and will carry a stock of complete drills and repair parts.

THE Vesey safety tamping plug, being introduced by W. N. W. Blayney, Denver, Colo., consists of a hardwood cylindrical piece, 6 inches long, cut diagonally into two sections, but held together by a small segment; a hole for the fuse to pass extends through it lengthwise. When the hole is loaded the cap is placed on the fuse in the usual way, and the plug is then put in the hole against the powder. A light tap struck against the small section of the plug breaks it from the larger section, driving the former like a wedge into the hole, firmly fastening the plug. It is claimed that the device saves time in loading, makes the work safer and, by reason of the tightness or firmness of the tamping, the explosive becomes more effective.

Books Received.

"Elevation and Stadia Tables," for obtaining differences of altitude for all angles and distances; with hydraulic tables, giving velocities for various channels and slopes; A. P. Davis. Published by Jno. Wiley & Sons, New York City, $1.

Notices of Recent Patents.

Among the patents recently obtained through Dewey, Strong & Co.'s SCIENTIFIC PRESS U. S. and Foreign Patent Agency, the following are worthy of special mention:

DEVICE FOR REMOVING CAPS FROM CANS AND THE LIKE.—No. 667,145. Jan. 29, 1901. J. W. Fuller, of Portland, Or. This invention relates to a device for the easy removal of screw caps from the tops of cans and other receptacles to which they are applied. These caps, when

screwed down to form a tight joint, often become set or stuck in place, and it is difficult to remove them. The invention is designed to make such removal easy. It consists of a disk which fits the interior of the screw cap, has an outwardly projecting lug, and this extends through a correspondingly shaped opening or notch, so that it extends above the top of the cap. In this lug, which is preferably oval or elongated in one direction, is a groove or channel, and this serves for the introduction of the blade of a screw driver laid in sidewise, or any bar of sufficient strength and length to give the proper leverage by which the can may be opened.

END THRUST COUNTERBALANCE FOR CENTRIFUGAL PUMPS AND SHAFTING.—No. 666,869. Jan. 29, 1901. F. H. Jackson, San Francisco, Cal. It is well understood by those familiar with centrifugal pumps that the discharge pressure between the runner and the case is never equal to the total discharge pressure in the involute of the case, or the discharge pipe of the pump, and these variations causing an unequal pressure on the two sides of the runner tend to force it in one direction or the other. It is the object of this invention to automatically regulate these pressures, and so counterbalance the runner or impeller that it will always remain approximately central within the case, without the aid of collars or other mechanical support. The exterior case encloses a runner or impeller mounted upon a shaft and revoluble within the case. The suction inlet passage opens into the case upon one side and approximately centrally, and the discharge takes place from the periphery of the case. The runner being driven by any suitable motor at a high rate of speed, will, by the centrifugal action upon the water after the pump is primed, draw the water in through the inlet and discharge it through the outlet. In order to balance these pressures the impeller has a running joint in the inlet passage and an annular flange projecting upon the opposite side, and extending into a correspondingly shaped chamber within this flange revolves with the runner. The passage connects this chamber with a suction inlet and is controlled by a central plug extending into it from the side of the case, so that when the pressure upon the runner moves it to one side, this passage is opened and the water escapes so as to counterbalance and return the runner to its central position.

List of U. S. Patents for Pacific Coast Inventors.

REPORTED BY DEWEY, STRONG & CO., PIONEER PATENT SOLICITORS FOR PACIFIC COAST.

FOR THE WEEK ENDING JAN. 29, 1901.

666,996. — TOE CLIP — A. M. Baldwin, Santa Cruz, Cal.
666,793.—WHEELBARROW AND SLED—C. C. Benson, San Diego, Cal.
666,640.—HORSE COLLAR—C. A. Blom, Orangeville, Cal.
666,999.—TEACHING ARITHMETIC—Borden & Wallace, Minturn, Cal.
666,734. — FREIGHT CAR — Campbell & Humphrey, Pendleton, Or.
667,003.—BUCKLE—A. J. Davidson, Douglas City, Cal.
667,145.—REMOVING CAPS FROM CANS—J. W. Fuller, Portland, Or.
666,752.—TONGS—A. J. Gustaveson, Tacoma, Wash.
666,869. — COUNTERBALANCE — F. H. Jackson, S. F.
667,017.—CURRENT MOTOR — C. Jasper, Spokane, Wash.
667,018.—SCALE DIAL — F. L. Kellogg, Santa Barbara, Cal.
666,932.—BOTTLE—E. Krahenbuhl, San Rafael, Cal.
668,098.—CARBON SHEET HOLDER—L. F. Miller, S. F.
667,032.—STEAM TRAP—W. D. O'Connor, Arlington, Wash.
666,818.—DRILL—J. H. Redfield, Bossburg, Or.
666,918.—WEIGHING MACHINE — H. B. Ruggles, Redlands, Cal.
666,984.—TUBE CUTTER—W. L. Stine, Simi, Cal.
666,943.—TWINE HOLDER—J. A. Thompson, Seattle, Wash.
666,986.—FRUIT PICKER—G. L. Thunen, Oroville, Cal.
667,108. — CAN OPENER — Thurlow & Epler, Seattle, Wash.
666,993. — TANK REGULATOR — J. N. Young, Alameda, Cal.
34,001.—DESIGN—F. A. Brewer, Jr., Watsonville, Cal.
34,008. — DESIGN — Yowell & Mitchell, Union, Or.

Latest Market Reports.

SAN FRANCISCO, Feb. 7, 1901.

SILVER—Per oz., Troy: London, 28⅛d (standard ounce, 925 fine); New York, bar silver, 61c (1000 fine); San Francisco, 61c; Mexican dollars, 50c.

A. M. Townsend, agent Hong Kong & Shanghai Banking Corporation, thinks that the recent advance in silver was due to the demand from the Indian Government for silver to be coined into rupees, and that the still more recent decline is due to the withdrawal of that demand. The fall in the price is also caused in part by dearer money in London, which makes it cost more to carry the metal. Mr. Townsend says that silver is still going into China at about the usual rate.

Mexican dollars in Manila are valued by the military government at 50 cents in gold. At the high price of silver in London, Mexican dollars were more than 50 cents in Hong Kong and were therefore exported from Manila. The military government attempted to check this movement by imposing an export duty of 10% on the Mexican dollars. At the decline in silver Mexican dollars are worth less than 50 cents in Manila, while the official valuation is 50 cents. It is expected that importation of them will be resumed.

COPPER.—New York: Lake, 1 to 3 casks, $16.87½; carload lots, 16.50; Electrolytic, 1 to 3 casks, 16.87½; carload lots, 16.35; Casting, 1 to 3 casks, 16.40; carload lots, 16.25. San Francisco: 18. Mill copper plates, 20c; bars, 22@23c.

LEAD.—New York, $4.37½; Salt Lake City, $4.00; St. Louis, $4.20; Missouri lead, $4.32½ desilverized lead; San Francisco $5.00, carload lots; 5½c 1000 to 4000 lbs.; pipe 6¾, sheet 7½, bar 6c; pig, $4.70 @5.10. London, £15 5s per ton.

The report that the settlement basis for lead in Utah had been lowered 10 cents per 100 pounds, and that this was merely a preliminary step to a general reduction of the price of lead to $3.90 per 100 pounds, is in general denied. The American Smelting Co. has made new contracts in Utah at $3.90 per 100 pounds, but it is understood that the general rate will remain at $4.

SPELTER. — New York, $4.05; St. Louis, $3.85; London, £18 5s per ton; San Francisco, ton lots, 5¼c; 100-lb lots, 6c.

ANTIMONY.—New York, Cookson's, 10c; Hallett's, 9½c; San Francisco, 1000-lb lots, 12c; 300 to 500 lbs., 13@14c; 100-lb lots, 15@18c.

IRON.—Pittsburg, Bessemer pig, $13.50; gray forge, $13.30; San Francisco, bar, per lb., 2.65c in small quantities.

STEEL.—Bessemer billets, Pittsburg, $21.00; open hearth billets, $21.50; San Francisco, bar, 7c to 12c per lb.

TIN.—New York, pig, $26.50; San Francisco, ton lots, 29c; 1000 lbs., 29½c; 500 lbs., 29½c; less, 30c; bar tin, ₱ lb, 35c.

QUICKSILVER. — New York, $51.00 large lots; London, £9 2s 6d; San Francisco, local, $47.50 ₱ flask of 76½ lbs.; Export, $44.

MAGNESIUM.—New York, $2.90 ₱ lb.; San Francisco, $3.75.

ZINC.—San Francisco, 5½c; slab, 5¾c; bar, 7c.

BABBITT METAL.— San Francisco, No. 1, 10c.

SOLDER. — Half-and-half, 100-lb. lots, 18½c; San Francisco, Plumbers', 100-lb. lots, 15½c.

ASSAY LITHARGE.—San Francisco, 10c ₱ lb, small lots.

BISMUTH.—New York, ₱ lb., $2.25 50-lb lots; San Francisco, $2.50 to $2.75 lb lots.

PLATINUM.—San Francisco, crude, $17 ₱ oz.; New York, $18.20 per Troy oz

ALUMINUM.—New York, No. 1, 99% pure ingots, 35c; No. 2, 90%, 30c to 35c.

FERRO-MANGANESE. — Pittsburg, 80%, domestic, $62.50, large lots.

PHOSPHORUS. — F. o. b. New York 50@60c ₱ lb.

POWDER.—F. o. b. San Francisco: No. 1. 70% nitro-glycerine, per lb., in carload lots, 15½c; less than one ton, 17½c. No. 1*, 60%, carload lots, 13½c; less than one ton, 15½c. No. 1** 50%, carload lots, 11½c; less than one ton, 13½c. No. 2, 40%, carload lots, 10c; less than one ton, 12c. No. 2* 35%, carload lots, 9½c; less than one ton, 11½c. No. 2** 30% carload lots, 9c; less than one ton, 11c. Black blasting powder in carload lots, minimum car 728 kegs, $1.50 per keg; less car lots, $2 per keg.

CAPS.—3x, $5.50 per 1000; 4x, $6.50; 5x, $8; Lion, $9, in lots not less than 1000.

FUSE.—Triple tape, $3.60 per 1000 feet; double tape, $3.00; single tape, $2.65; Hemp, $2.10; Cement No. 2, $3.00; Cement No. 1, $2.65, in lots of 3000 feet and up.

CANDLES.—Granite 6s, 16 oz., 40s., 11½c ₱ set; 14 oz., 40s., 10c.

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NOTICE OF AMENDMENT OF ARTICLES OF INCORPORATION.
Notice is hereby given that it is the intention of the JAMISON MINING COMPANY to amend its Articles of Incorporation by substituting for the second of said articles setting forth the purposes of the Corporation, which now reads:
"2nd. That the purposes for which it is formed are: The acquisition of quartz mines and gravel mines in the State of California, and to work the same for gold and silver; also, to acquire, hold and use water and water-rights and privileges in connection with such mining; also, to acquire, hold and use timber lands in connection with such mining," the following:
Second:—That the purposes for which it is formed are: To mine for, and mill and reduce ores of all kinds; to acquire by location, purchase or otherwise, to own, hold, work and operate mines in and throughout the State of California; to acquire by purchase or otherwise, to own, hold, develop, improve, lease, let, mortgage, grant, bargain, sell and convey mines, and mining claims and properties in the State of California; to acquire, by purchase or otherwise, to build, erect, construct, own, operate, lease, let, mortgage, grant, bargain, sell and convey mills, and other reduction and smelting works, for the milling and reduction and smelting of ores, and to deal in precious metals and minerals and the products of mines of every kind, and to transport and provide ways and means to transport the same to market, and to market and sell the same; to acquire, by purchase or otherwise, to improve, develop, own, hold, use, lease, let, mortgage, grant, bargain, sell and convey real property, lands, water, water-rights, privileges, and franchises of every kind, in and throughout the State of California; to buy, own, hold, sell and generally deal in goods, wares and merchandise, and all kinds of personal property, including the stocks of other corporations, also bonds, notes and personal securities of every kind. To establish and maintain agencies of said Corporation, and to appoint and employ agents, wherever it may be deemed best by said Company; and generally to do any and everything necessary, proper or expedient to carry out the aforesaid purposes and carry on the business of said Corporation.

NOTICE OF STOCKHOLDERS' MEETING.
A Special Meeting of the Stockholders of the JAMISON MINING COMPANY for the purpose of considering and acting upon the matter of Amending its Articles of Incorporation, as above provided, will be held at the office of the company, room 54, 120 Sutter street, San Francisco, California, at two o'clock P. M. on Monday, the 11th day of February, 1901.
By order of the Board at its meeting of December 31st, 1900. SAM W. CHEYNEY,
Secretary Jamison Mining Company.

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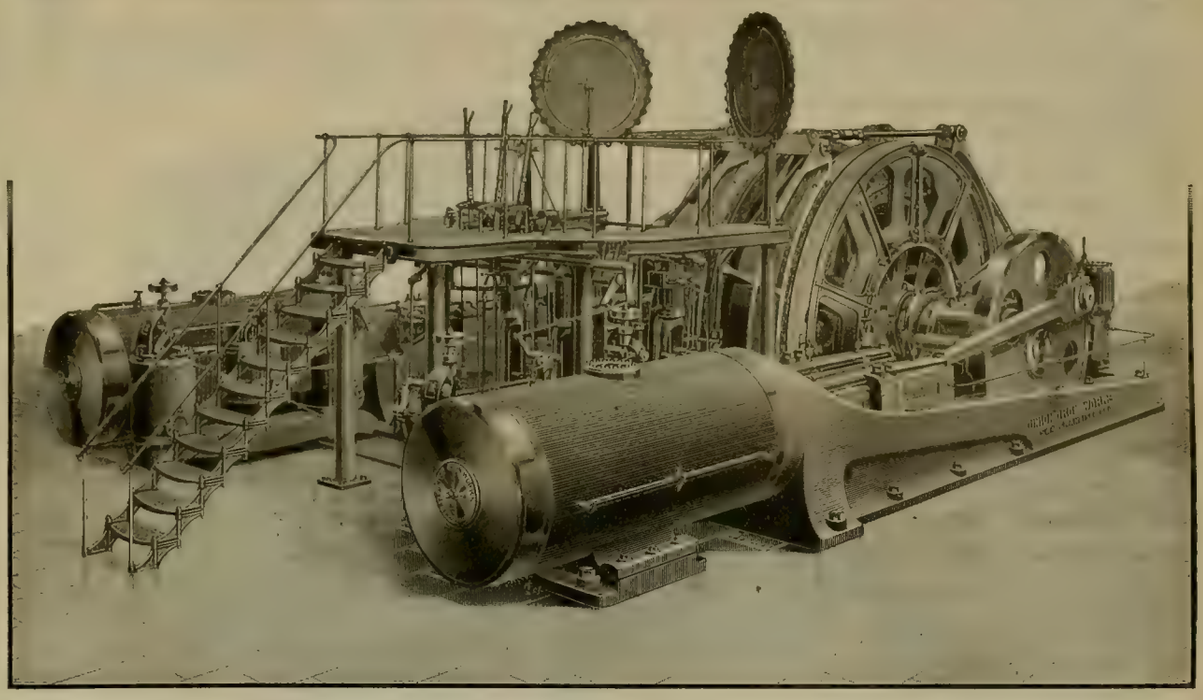
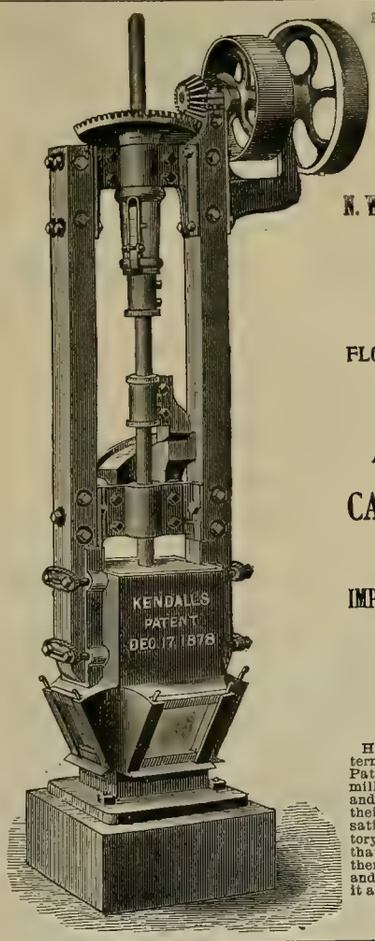


The brakes, clutches and reversing gear are arranged to be operated by compressed air or steam, by means of auxiliary cylinders which are under full control of the engineer, stationed upon the elevated platform shown, insuring the most rapid work with absolute safety. Shaft hollow forged steel of ample strength and stiffness to withstand any strains; reciprocating parts of steel and are as light as consistent with the duty required; cylinders of the "overhung" type, weight being taken by a guide saddle, which admits of free longitudinal movement, due to expansion, causing no strain on bed plate or foundations; cylinders steam-jacketed, fitted with valves provided with Corliss releasing gear and hand cut-off, enabling the engines to be run economically with reference to the work to be performed; bed plates modification of the Porter Allen type, heavy and substantial, with large foundation base and anchor bolts. A duplicate of this engine has also been furnished the Homestake Mining Company of Dakota.



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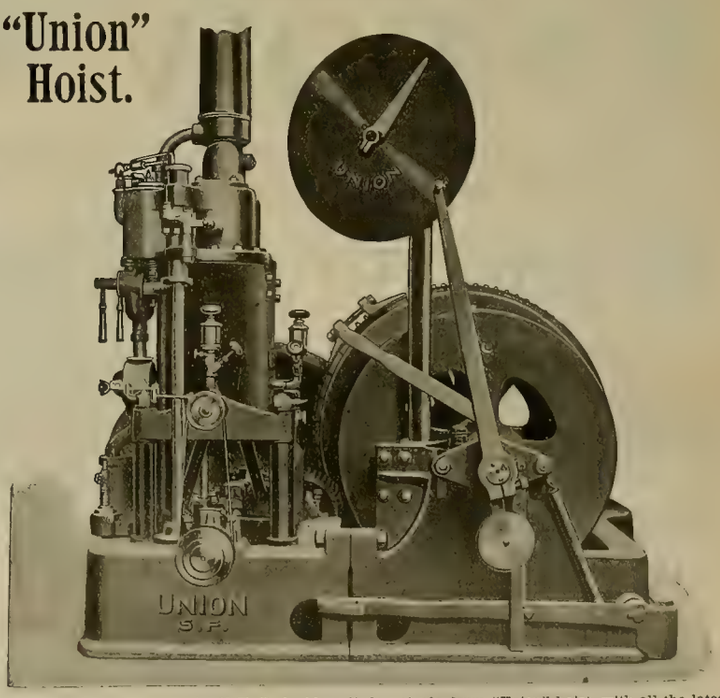

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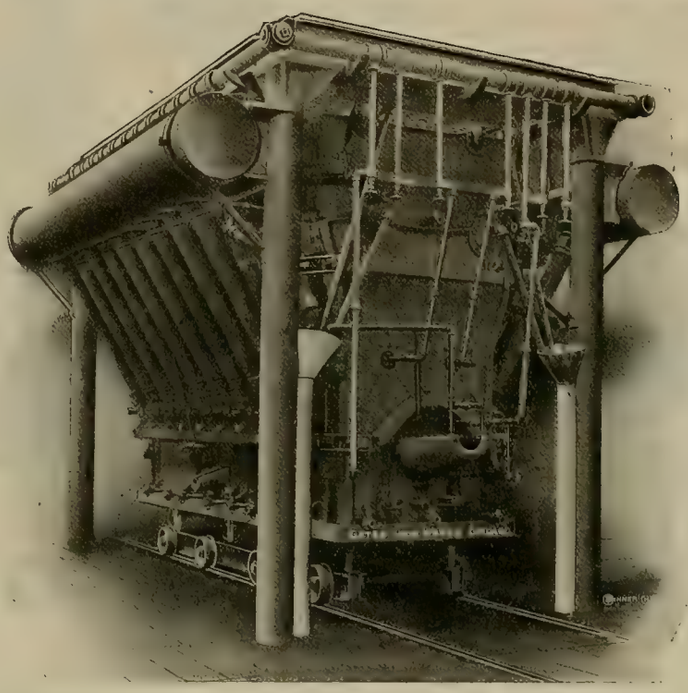
GATES IRON WORKS

The Copper Furnace herewith reproduced is one of two sold to the GRANBY CONSOLIDATED MINING AND SMELTING CO., LTD., BRITISH COLUMBIA. The size is 44x160 inches. These two furnaces were sold on a guaranteed capacity of 500 tons per day. Before the furnaces had been in operation a month they developed an average capacity of 600 tons per day, and the highest daily record has exceeded 735 tons. The cost of operation has steadily declined under the management of General Manager Hodges, until six-dollar copper ore is paying a handsome profit.

FULL DETAILS OF OUR SMELTING FURNACES GIVEN IN OUR NO. 11 BOOKLET.



All of GATES IRON WORKS machinery is as good as it is represented to be, and often much better. We build every modern type of apparatus for the reduction of the precious ores by every established process. Our three great lines are these:

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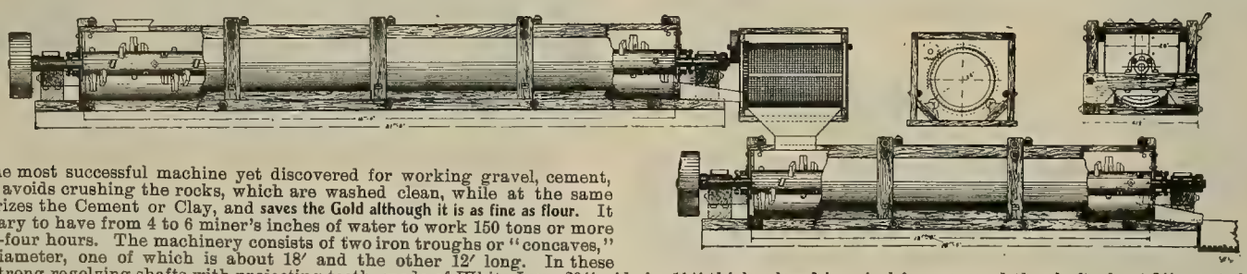

This is the most successful machine yet discovered for working gravel, cement, clay, etc. It avoids crushing the rocks, which are washed clean, while at the same time it pulverizes the Cement or Clay, and **saves the Gold although it is as fine as flour.** It is only necessary to have from 4 to 6 miner's inches of water to work 150 tons or more every twenty-four hours. The machinery consists of two iron troughs or "concaves," each 26″ in diameter, one of which is about 18′ and the other 12′ long. In these troughs are strong revolving shafts with projecting teeth, made of White Iron, 2¾″ wide by 1¼″ thick, placed in spiral form around the shaft about 2″ apart, forming a conveyor. The first shaft is geared to make from 150 to 250 revolutions per minute, and the second one from 300 to 500. There is a revolving screen between the two troughs that takes out the coarser rocks after being washed, and only the finer material runs into the second trough, and is there worked thoroughly. There is a space of about 4″ in the bottom of each trough, or "concave," that fills up with gravel and sand. When the gold is free it settles into this, and as the teeth do not disturb the bottom, the gold remains there until a cleanup is made. In many cases the 18′ machine alone is needed, as the two are only used where we have hard Cement or Clay to work. It requires from 10 to 12 H. P. to run the complete machine, and from 6 to 8 H. P. for the 18′ one alone. I also manufacture a 6′ machine about one-half the diameter of the others, and lighter in proportion, to be run by hand power, with small amount of water, and capacity of about two tons per hour. This can be easily moved from place to place.

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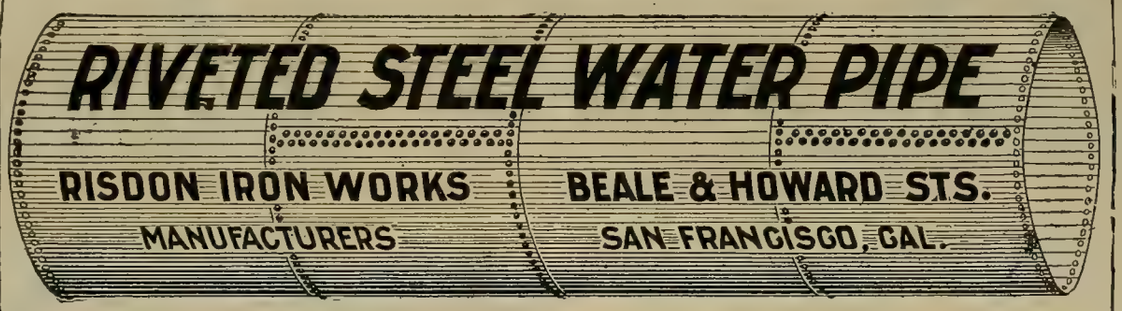

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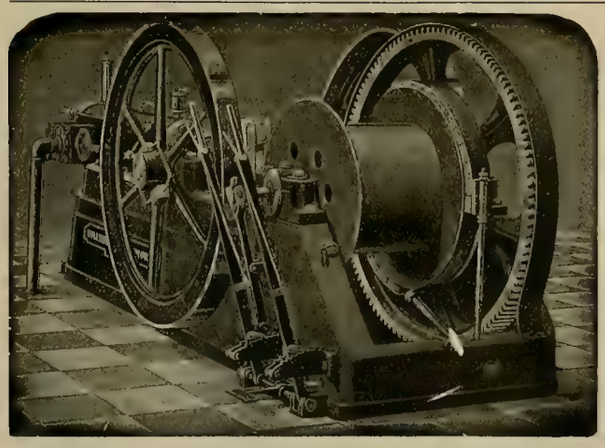

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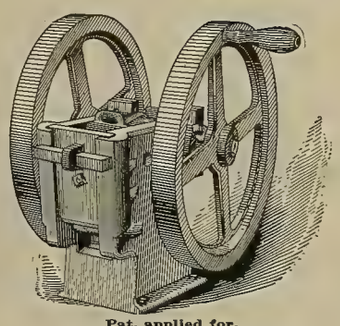

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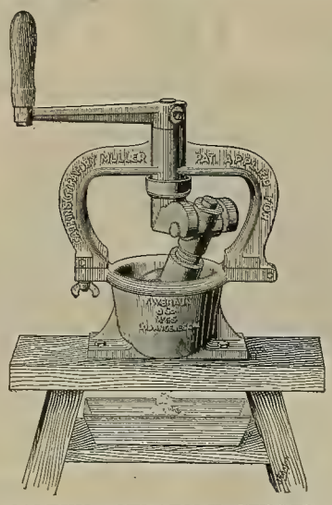

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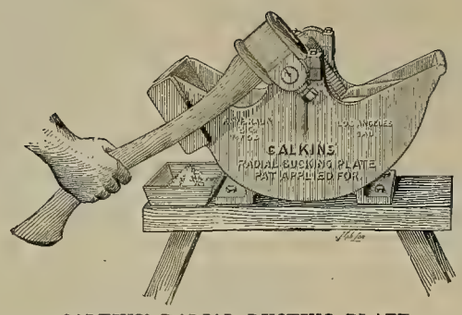

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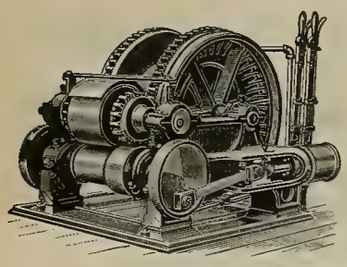

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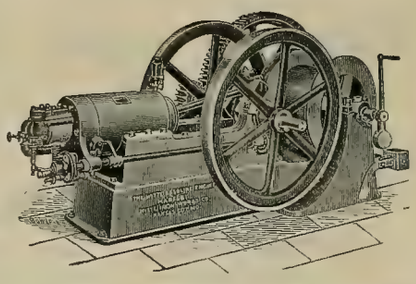

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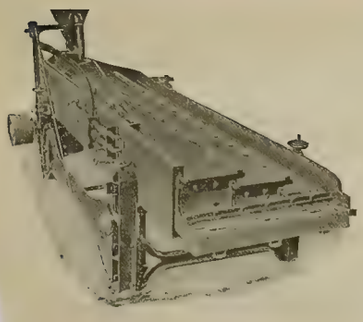

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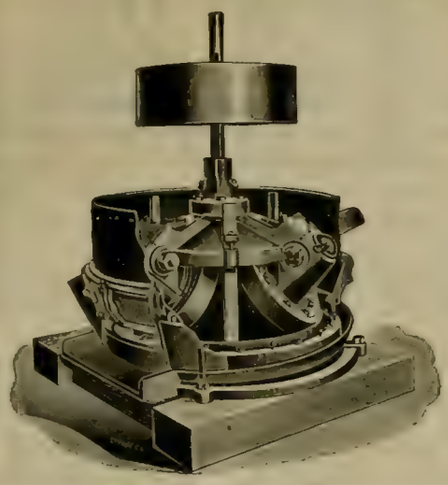

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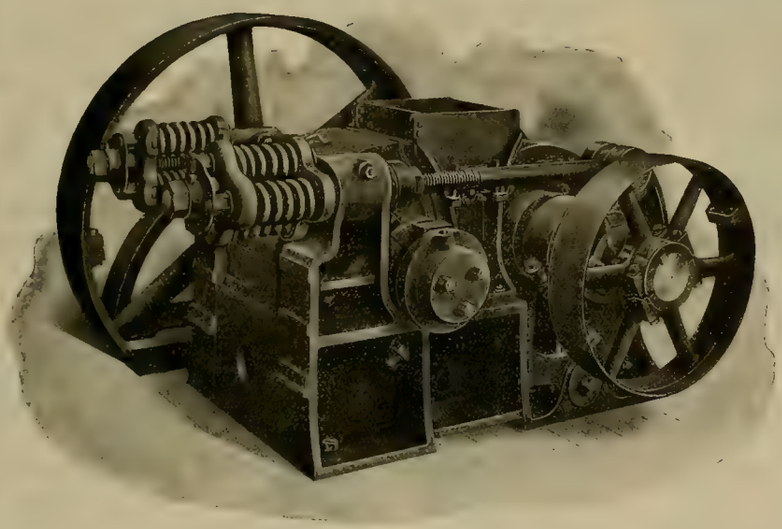

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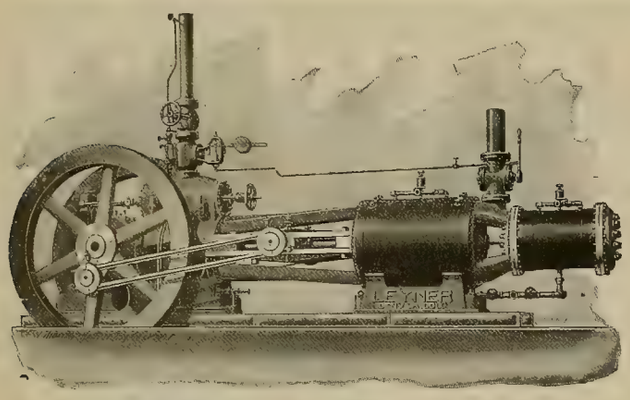

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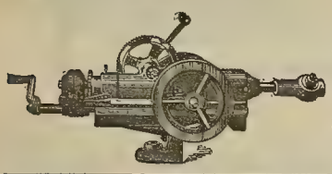

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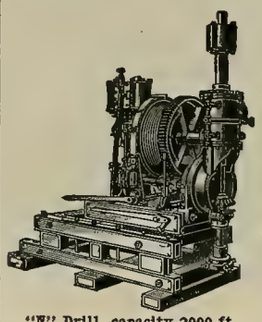

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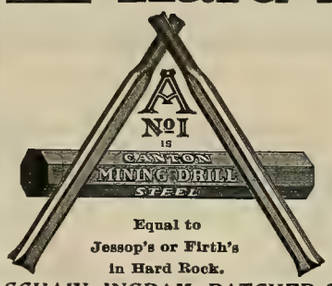

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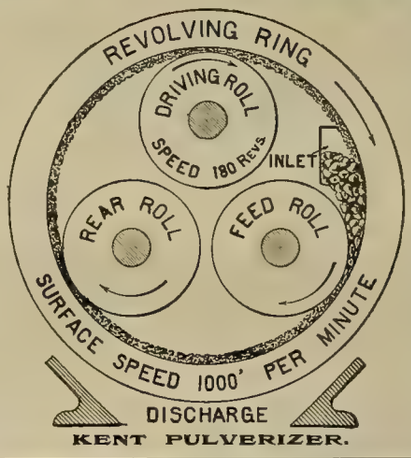

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Equals a 50-ton stamp mill. Grinds to any mesh under 8.
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34-36 STEUART ST., SAN FRANCISCO, CAL. ..... AGENTS FOR PACIFIC COAST.

THE IDEAL CONVEYOR BELT

Is the one that will carry stone, ore, coal, wet or dry material, holding buckets firmly and securely; will stand all kinds of exposure, and resist the heaviest strains during a long period of service. This is what the **LEVIATHAN BELT** has done, and we quote the following from a letter from the New York Steam Co.:

"We have used Leviathan Belting for four years, up to 24-inch by 8-ply, elevating and conveying coal. Some of the Belting is outside, exposed to freezing weather; some in a steam bath. In both conditions the results have been very gratifying, over 500 tons having been handled in ten hours time."

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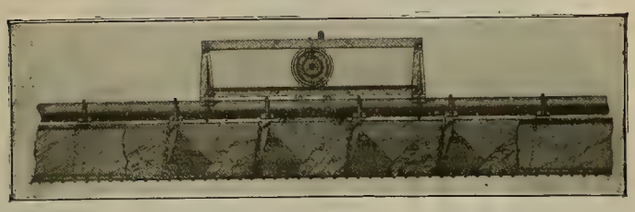
FOR TRANSPORTING QUARTZ, TAILINGS, SAND, ETC.



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PERFECT DISCHARGE ELEVATORS.
COMPLETE INSTALLATIONS.

HEYL & PATTERSON, Pittsburg.

TELL US WHERE YOU'RE AT.

4 Cents Per Ton Per Mile

Is what it costs to transport Ore with our systems of Aerial Wire Rope Tramways.

We'd like to send you our book telling you all about it, but we can't do it unless you write us

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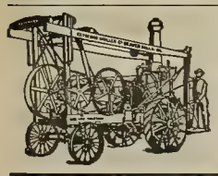

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Multitudes in use for testing for minerals. Sizes and equipments to suit any and all conditions. Unexcelled for Placer Testing, Oil Wells, Water Wells, testing for Lead and Zinc, Iron and Coal; goes through anything; brings up everything. Large sizes drill as much as 1500 feet. In use all over the world. Every purchaser pleased. Used on boats for testing river and lake beds. Water no hindrance. No skilled labor required.

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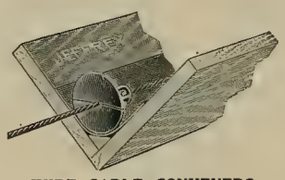

WIRE CABLE CONVEYERS for Long and Short Distance Conveying.

CHAINS--ALL STYLES,
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COAL AND COKE CRUSHERS,
COAL HANDLING MACHINERY,
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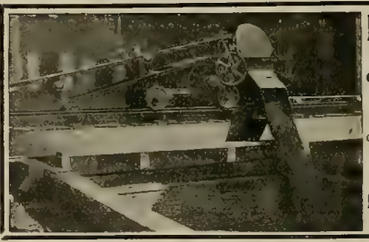

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HANDLE
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Cut shows conveyor elevating and distributing coal in storage.

New Catalogue Now Ready.

ROBINS CONVEYING BELT CO.,
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TO SECURE GOOD RESULTS BUY

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FOR TOOLS, MINING DRILLS, ETC.

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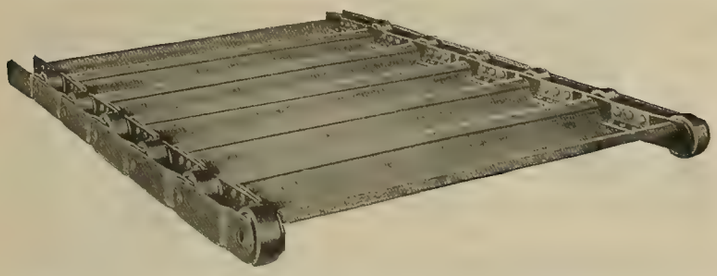

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A heavy, endless, metallic apron carried on bushed rolling chains, used for Sorting and Hand Picking ORE, COAL, PHOSPHATE ROCK, etc., combining great STRENGTH and DURABILITY.

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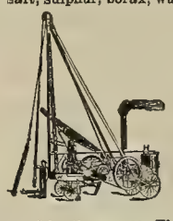
A BORE HOLE

is the cheapest, quickest, most direct, and most effective way to test lands for minerals, oil, gas, salt, sulphur, borax, water, etc.



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excel for these uses. They will drill a hole through anything to any depth from 250 to 2500 feet. The only machines made that are absolutely without annoying springs. They are simple, powerful and efficient. Easy to handle at work or on the road. Used in every State and Territory and in many foreign countries.

We also make full line of drill tool-bits, reamers, sand pumps, spuds, etc., etc. Write for illustrated free catalogue.

Star Drilling Machine Co.,
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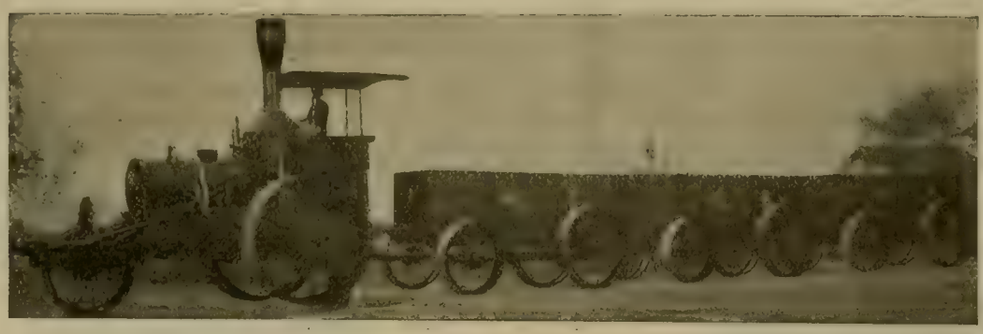
"THE DANIEL BEST"
50-Horse Power Traction Engine.

Freight carrying capacity of wagons, 16 TONS EACH, or a total capacity of train, 48 TONS.



CAPACITY OF ENGINE, 50-Horse Power.

Over One Hundred of these Powerful Engines in use on this Coast in the principal Logging and Lumbering Camps and for general freighting purposes.

EVERY ONE A SUCCESS AND MONEY MAKERS.

These outfits are particularly adapted to haul freight of any description from out-of-the-way places, and will reduce the cost of transportation at least one-half and in many instances two-thirds. They can generally be worked where animal teams now do the work, and haul their immense loads of from thirty to fifty tons, ascending and descending grades as much as 5 per cent to 30 per cent, depending upon condition of the road; loads may be increased to even greater amount on a firm and moderately level road.

Send for Descriptive Circulars and Price List. Wagons are built which are best suited for the kind of freight to be handled.

Estimates made for complete Steam Freighting Outfits. Address

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Westinghouse Induction Motor Operating Mine Hoist.

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Induction Motor.

Universally adopted for the economic operation of mine machinery.

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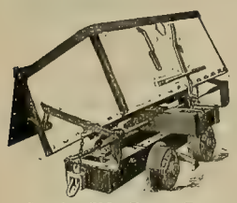
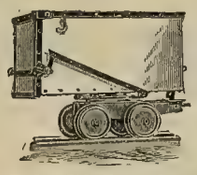
Truax Automatic Ore Cars.



Special Side Dump Car, Patented.

COST NO MORE THAN COMMON CARS.



End or Side Dump Car, Patented.

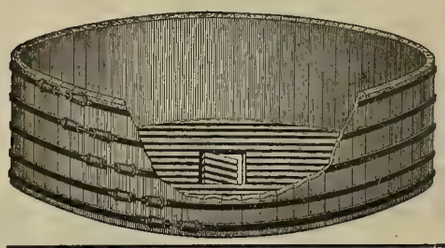
We build these cars in a shop devoted exclusively to their manufacture, using the best quality of Steel and Malleable Iron, thus assuring strength and durability.

GLOBE IRON WORKS, Stockton, Cal.

Sole Manufacturers for the Pacific Coast.

SOLD IN REDDING BY THE McCORMICK-SAELTZER CO. SEND FOR CATALOGUE.

FOR **CYANIDE PLANTS** OR MINING—



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OF ANY DESCRIPTION.

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PACIFIC TANK CO.,

348 E. 2nd Street, Los Angeles. 35 Beale Street, San Francisco.

Illustrated Catalogue Mailed Free.

Are You Confronted With a Difficult Ore-Separating Problem?

THE WETHERILL MAGNETIC SEPARATING PROCESS may prove the solution. Apply to Wetherill Separating Company, 52 Broadway, N. Y.

SELBY SMELTING AND LEAD CO.,

REFINERS OF GOLD AND SILVER BARS, GOLD DUST, ETC.

Buyers of Gold, Silver, Lead and Copper Ores, Gold Concentrates, Lead Bullion, Cyanide Product, Etc.

ORE AND BULLION ASSAYERS.

Works at VALLEJO JUNCTION, CAL. Office, 416 MONTGOMERY ST., SAN FRANCISCO, CAL.

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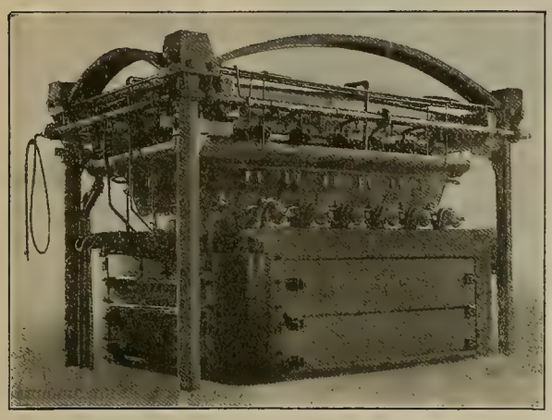

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Smelting Furnaces and Equipments.

The illustration in this advertisement shows one form of our COPPER MATTING FURNACE, employing hot blast; the air being first treated in proper appliance, is conducted through the cast iron bustle pipes placed along the inside of the caisson plates, through the cast iron adjustable tuyeres. This furnace can also be used for silver as well as copper smelting, by changing lining in crucibles. We build them in any size required.

Cold blast may be used if preferred.

The furnace is equipped with our special cast iron jackets, and our patented system of water-jacketed mantles.

Send for our catalogue, showing many different styles of smelters for the treatment of

GOLD, SILVER, LEAD, COPPER AND NICKEL ORES,

also the latest and best method for the economical use of jacket water (a saving of 80% to 90% guaranteed) by our patented

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We design, manufacture and erect Mills for Concentration and Amalgamation, Milling, Chlorination and Cyanide Processes. In writing for information, give us the analysis or character of the ore to be treated, to enable us to intelligently arrive at the proper method.

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ESTABLISHED 1860. DENVER, COLORADO, U. S. A.

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IRON, STEEL, or COPPER WIRE

for Every Purpose.

WIRE ROPES For Hoisting, Hauling, Power Transmission, Bridge Work, etc.

As we make the wires from exceptionally high grade steel and iron of our own production, we offer special features in STRENGTH, DURABILITY, FLEXIBILITY.

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Bare, Insulated, Stranded or Cables in every form for every purpose.

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STEEL SHAFTING and BARS IN ALL SHAPES.

TRACK SPIKES.

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High Grade Machinery.

COMPLETE PLANTS INSTALLED.

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STATIONARY BOILERS MARINE

CHAS. C. MOORE,

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JOSHUA HENDY MACHINE WORKS,

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HYDRAULIC MINING MACHINERY.

Type of 20-Inch "Hendy" Hydraulic Gravel Elevator, Illustrating the Substantial Construction and Showing Ball-Joint Attachment.

"HENDY" IMPROVED GRAVEL ELEVATORS, WATER LIFTERS, SAND AND GRAVEL PUMPS.

HOISTING DERRICKS==Operated by Hand or Water Power, of from 3 to 10 Tons Lifting Capacities.

HYDRAULIC GIANTS==Double Jointed Ball Bearing and Single Jointed Giants, Water and Reservoir Gates, and Hydraulic Riveted Pipe.

Mining Cars, Tee Rail, and General Mining Supplies.

Write for Catalogue and Prices.

IN COMPETITION WITH THE ENTIRE WORLD.

THE ONLY

GOLD MEDAL

GIVEN AT THE

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FOR EXHIBITS OF

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WAS AWARDED TO

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ESTABLISHED 1855

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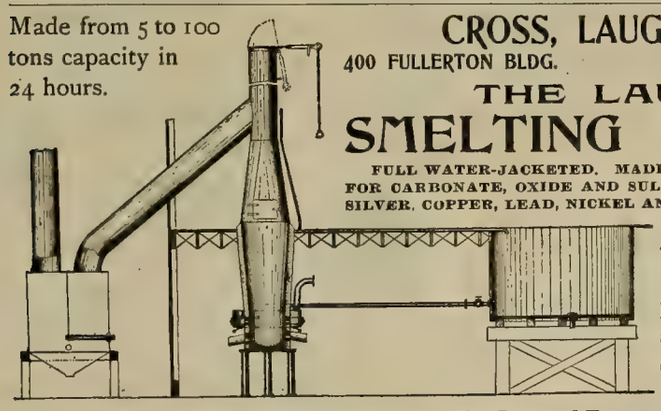
Made from 5 to 100 tons capacity in 24 hours.



Sectional Side View of a Round Furnace, with Flue Dust and Fume Condenser, and Automatic Water-Jacket Feed Attachment.

CROSS, LAUGHLIN & CO.,

400 FULLERTON BLDG. ST. LOUIS, MO., U. S. A.

THE LAUGHLIN

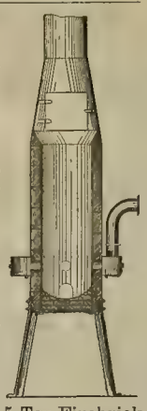
SMELTING FURNACES.

FULL WATER-JACKETED. MADE ENTIRELY OF STEEL AND IRON. FOR CARBONATE, OXIDE AND SULPHIDE ORES, CONTAINING GOLD, SILVER, COPPER, LEAD, NICKEL AND COBALT.

An Improved Furnace.

Product of years of actual practice with the leading styles of smelters, and of close observation of their working.

Catalogues and Estimates Furnished on Application.



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SULPHURIC ACID

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For Chlorination, Refining and other processes. Also Muriatic and Nitric Acids, Blue Vitriol, Copperas Commercial and C. P. Our chemically pure Acids and Ammonia are guaranteed perfect.

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AMALGAMATE

In substance at one operation by the

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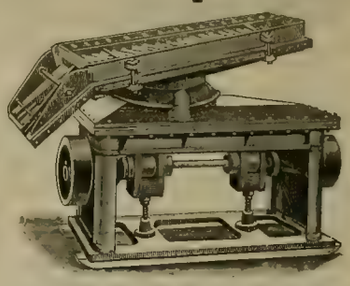

Floor Space, 3x6 Ft. Weight, 2250 Lbs. Capacity, 10 to 50 Tons Daily.

WE USE NEITHER WATER, CHEMICALS NOR QUICKSILVER.

Ores, etc., Treated:

Gold,	Copper,	Corundum,
Lead,	Chrome,	Antimony,
Zinc,	Nickel,	Cinnabar,
Mica,	Clays,	Black Sands,
Tin,	Garnet,	Any Sands,
Slags,	Graphite,	Mixed Ores,
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SAMPLE LOTS TREATED FREE.

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Capt. C. S. Collins, 58 Broad St., N. Y., says: "It's the best GOLD saver in the world."

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The Hooper Pneumatic System

Is the only reliable method of treating mixed, slimy or rebellious ores. Zinc and lead combinations handled in good shape where all other processes had failed.

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Ore Tested in Carload Lots.

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Complete Ore-Testing Works — capacity ten pounds to two tons. Modern Methods of Lixiviation, Cyanide and Chlorination. Concentration on Bartlett Table. Assaying and Bullion Refining. Chemical Analyses of Oils, Coal, Water, and all solutions. WRITE FOR PRICES.

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Sole Agents for the "AINSWORTH BALANCES."

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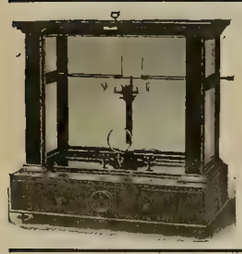

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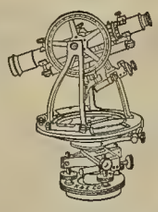

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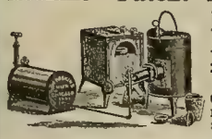

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REDUCE the COST of LIGHT

by getting the best lamps. Try ours. Most light — least current — longest life. Let us tell you why and how. Sample lamps free.

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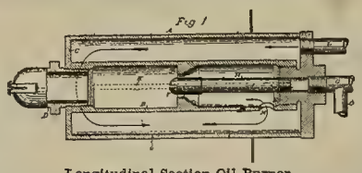

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PETROLEUM,

The Coming Fuel for Making Steam Economically.

Coalinga, Bakersfield, or McKittrick Oil delivered in any quantity.

COMPLETE OIL BURNING PLANTS OUR SPECIALTY.

Manufacturers of the **LARKIN OIL FILTER.** Pacific Coast Agents for Stirling Water Tube Boiler, St. Louis Car Co., Missouri Car & Foundry Co., G. D. Boiler Cleaner Co. Write for Particulars.

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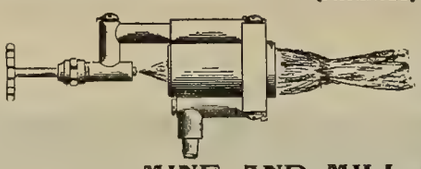
Taylor's Coal Oil and Gasoline Burner

(PATENTED)



A new heating burner for Assayers and Chemists, or for brazing, in which coal oil at 33 deg. to 45 deg., Beaume and 150 deg. fire test, or gasoline at 74 deg. test can be used for fuel. Adapted to crucible, muffle and brazing work. **Price $6.** For sale by

JOHN TAYLOR & CO.,

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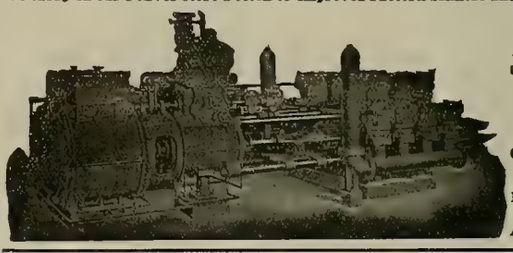

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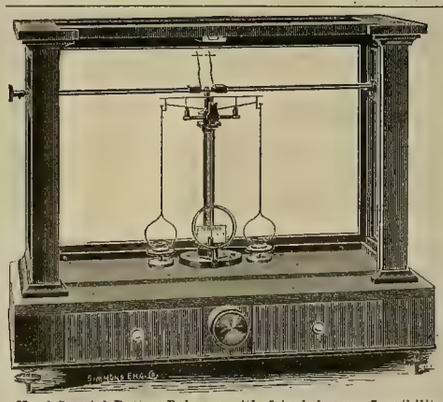

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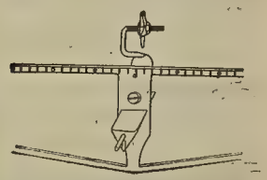

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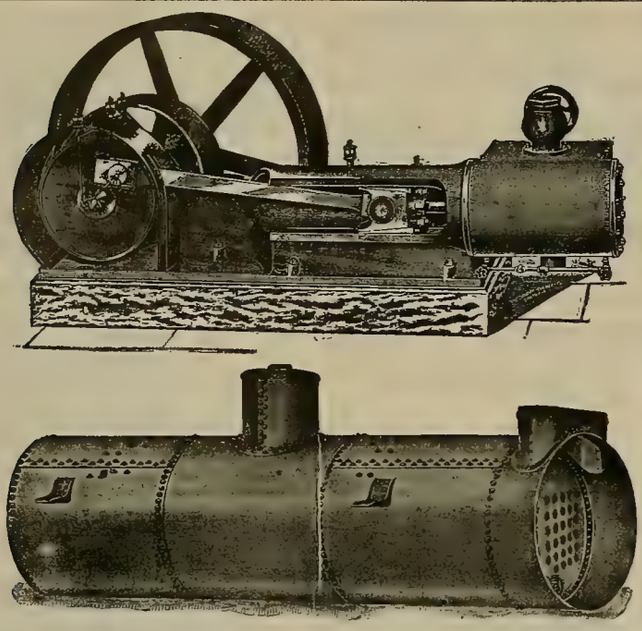

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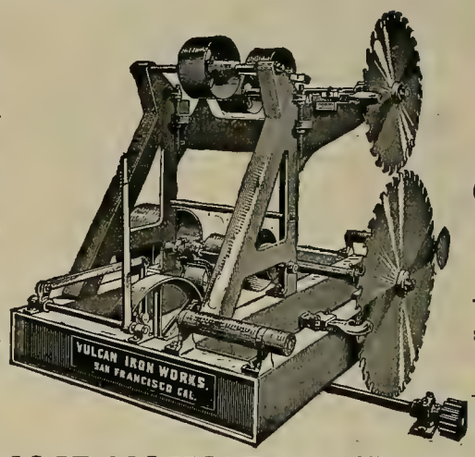

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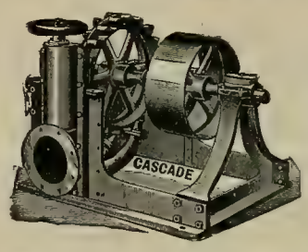

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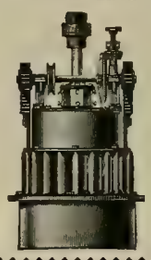

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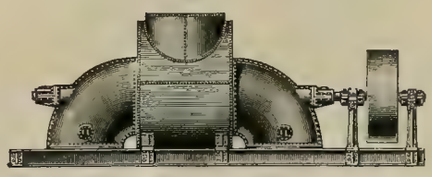

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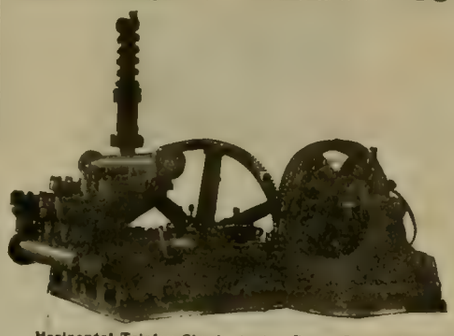

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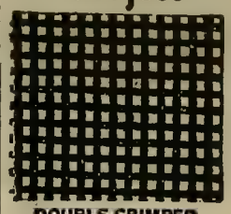

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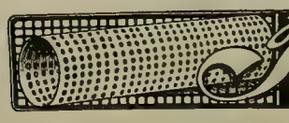

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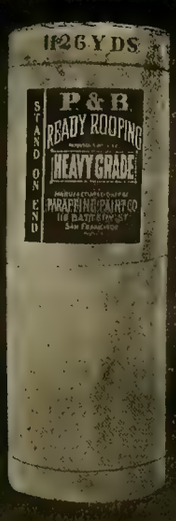

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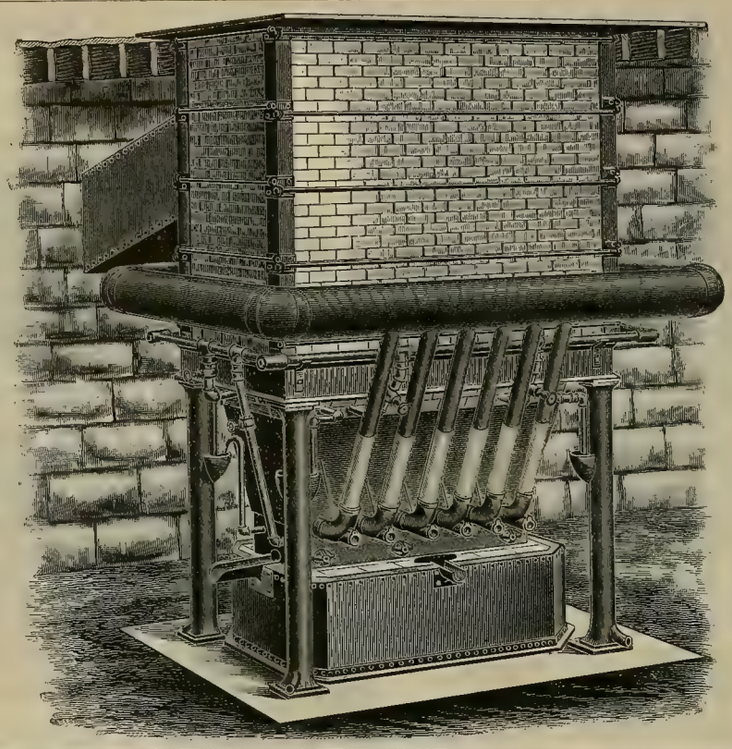

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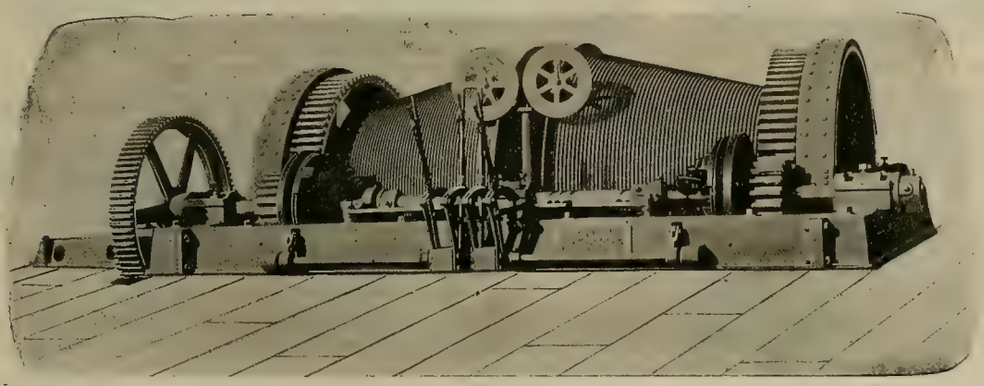
IN SUCCESSFUL OPERATION. Send for Bulletin No. 1003.



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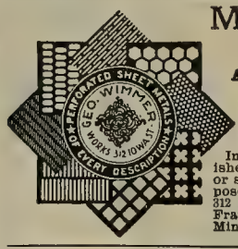

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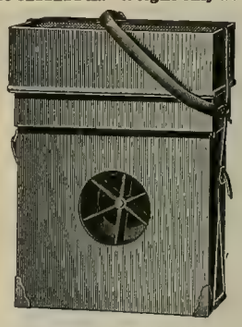

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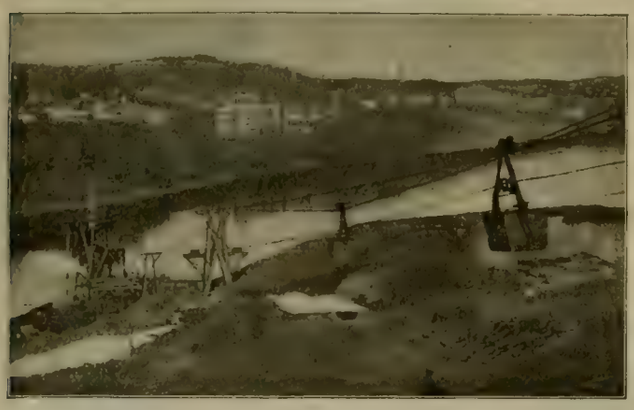

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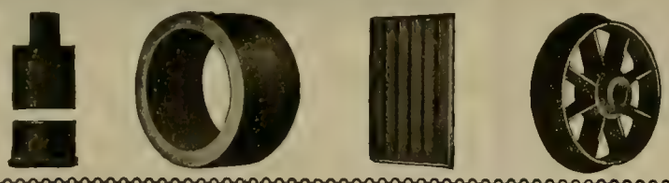

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THE CALIFORNIA DEBRIS COMMISSION HAVING received applications to mine by the hydraulic process from Peter H. Russell, in the Dad's Gulch Mine, near Camptonville, Yuba Co., to deposit tailings in Brandy Creek; from Wm. Abbott and Louis W. Clark, in the Gold Hill Placer Mine, near Rackerby, Yuba Co., to deposit tailings in a ravine below the mine; and from E. C. and P. J. Rigney, in the Maxey Mine, near Mountain Ranch, Calaveras Co., to deposit tailings in O'Neil's Creek, gives notice that a meeting will be held at Room 59, Flood Building, San Francisco, Cal., on February 11, 1901, at 1:30 P. M.

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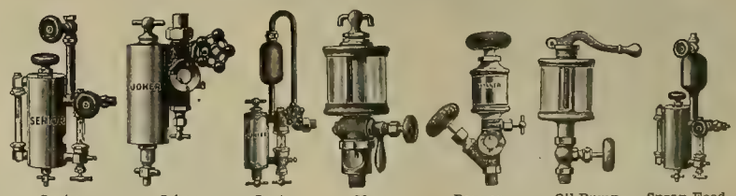

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ASSESSMENT NOTICES.

MARIPOSA COMMERCIAL AND MINING COMPANY.—Location of principal place of business, San Francisco, California; location of works, Mariposa County, California.

Notice is hereby given, that at a meeting of the Board of Directors, held on the 24th day of December, 1900, an assessment (No. 20) of Ten ($10) Dollars per share was levied upon the capital stock of the corporation, payable immediately in United States gold coin, to the secretary, at the office of the company, 320 Sansome street, room 24, San Francisco, California.

Any stock upon which this assessment shall remain unpaid on the 11th day of February, 1901, will be delinquent, and advertised for sale at public auction; and unless payment is made before, will be sold on SATURDAY, the 2nd day of March, 1901, to pay the delinquent assessment, together with the costs of advertising and expenses of sale.

By order of the Board of Directors.

JOSEPH H. MOOSER, Secretary.

Office—320 Sansome street, room 24, San Francisco, California.

TANANA MINING COMPANY.—Location of principal place of business, San Francisco, California.

Notice is hereby given, that at a meeting of the Board of Directors, held on the 20th day of December, A. D. 1900, an assessment (No. 2) of ten cents per share was levied upon the capital stock of the corporation, payable immediately in United States gold coin to the secretary, Edward H. Stearns, at his office, Room 801 Claus Spreckels Building, Cor. Third and Market Sts., San Francisco, California.

Any stock upon which this assessment shall remain unpaid on the 13th day of February, 1901, will be delinquent and advertised for sale at public auction; and unless payment is made before, will be sold on WEDNESDAY, the 6th day of March, 1901, to pay the delinquent assessment, together with the costs of advertising and expenses of sale.

By order of the Board of Directors.

EDWARD H. STEARNS, Secretary.

Office—Room 801 Claus Spreckels Building, Cor. Third and Market Sts., San Francisco, California.

YUBA RIVER GOLD DREDGING COMPANY.—Location of principal place of business, San Francisco, California; location of works, Smartsville, Yuba County, California.

Notice is hereby given, that at a meeting of the Board of Directors, held on the 4th day of January, 1901, an assessment (No. 2) of three cents (3 cents) per share was levied upon the capital stock of the corporation, payable immediately in United States gold coin, to the secretary, at the office of the company, No. 214 Pine street, Room 29, San Francisco, California.

Any stock upon which this assessment shall remain unpaid on the 9th day of February, 1901, will be delinquent, and advertised for sale at public auction; and unless payment is made before, will be sold on TUESDAY, the 5th day of March, 1901, to pay the delinquent assessment, together with the costs of advertising and expenses of sale.

By order of the Board of Directors.

ALBERT CERF, Secretary.

Office—No. 214 Pine street, Room 29, San Francisco, California.

LARKIN MINING COMPANY.—Location of principal place of business, San Francisco, California; location of works El Dorado County, California

Notice is hereby given, that at a meeting of the Board of Directors, held on the 18th day of January, 1901, an assessment (No 9) of two (2) cents per share was levied upon the capital stock of the corporation, payable immediately in United States gold coin, to the secretary, at the office of the company, 112 Main street, San Francisco, California.

Any stock upon which this assessment shall remain unpaid on the 25th day of February, 1901, will be delinquent and advertised for sale at public auction; and unless payment is made before, will be sold on MONDAY, the 18th day of March, 1901, to pay the delinquent assessment, together with the costs of advertising and expenses of sale.

By order of the Board of Directors.

N. F. REMINGTON, Secretary.

Office—112 Main street, San Francisco, California.

DELINQUENT SALE NOTICE.

MAY DAY GOLD & SILVER MINING COMPANY.—Location of principal place of business, San Francisco, California; location of works, Calaveras County, California.

Notice.—There are delinquent upon the following described stock, on account of assessment (No. 5) levied on the 30th day of November, 1900, the several amounts set opposite the names of the respective shareholders, as follows:

Names.	No. Cert.	No. Shares.	Amt.
William H. Chapman	42	100	$5 00
Thos. A. DeLay	48	600	30 00
Thos. A. DeLay, Trustee	88	6 000	300 00
Thos. A. DeLay, Trustee	90	5,000	250 00

And in accordance with law, and an order from the Board of Directors, made on the 30th day of November, 1900, so many shares of each parcel of such stock as may be necessary, will be sold at public auction, at the office of the company, at Heald's Business College, No. 24 Post street, San Francisco, California, on TUESDAY, the 19th day of February, 1901, at the hour of 1 o'clock P. M. of said day, to pay said delinquent assessment thereon, together with costs of advertising and expenses of sale.

EDWARD H. STEARNS, Secretary.

Office of Company—Heald's Business College, 24 Post St., San Francisco, California.

DELINQUENT SALE NOTICE.

AMERICAN OIL AND REFINERY COMPANY.—Location of principal place of business, San Francisco, California. Location of works, Contra Costa County, California.

NOTICE.—There are delinquent upon the following described stock, on account of assessment (No. 2) levied on the 26th day of November, 1900, the several amounts set opposite the names of the respective shareholders, as follows:

Names.	No. Cert.	No. Shares.	Amt.
Abbott, William	720	50	$2 50
Abbott, William	721	50	2 50
Abbott, William	722	50	2 50
Abbott, William	723	25	1 25
Abbott William	734	25	1 25
Anthony, J. C., Trustee	797	1,000	50 00
Anthony, J. C., Trustee	798	1,000	50 00
Anthony, J. C., Trustee	799	1,000	50 00
Anthony, J. C., Trustee	973	1,000	50 00
Anthony, J. C., Trustee	1021	4 300	215 00
Dignan, J. P.	1039	1,000	50 00
French, Mrs. Mary L.	385	2	10
Goodenough, S.	1046	380	19 00
Holbrook, W. E., Trustee	897	10 000	500 00
Holbrook, W. E., Trustee	898	11,000	550 00
Holbrook, W. E., Trustee	899	4 500	225 00
Holbrook, W. E., Trustee	900	4,500	225 00
Kielhofer, Mrs. Louis	298	2	10
Kraehmer, Louis L.	471	3	15
Laird, Mrs. L. N.	230	5	25
Lord, Mrs. Leona E.	327	2.000	100 00
Lucas, Mrs. T. R.	848	10	50
Mayer, Mrs. L.	406	800	40 00
Massey, James B.	914	1	05
McKelvey, Mrs Angelina	71	12	60
McAllister, H. L.	1071	100	5 00
Pope, Wm	656	50	2 50
Pope, Wm	695	20	1 00
Pope, Wm	764	30	1 50
Pope, Wm	908	20	1 00
Raht, Julia F.	321	25	1 25
Raht, Julia F.	453	40	2 00
Rachel, Mrs. Eliza	856	400	20 00
Royce, Lizzie A.	441	5	25
Russell, G. E.	125	3	15
Stover, W. M.	1047	480	24 00
Truitt, J. J.	399	5	25
Walser, Mark	858	1,000	50 00
Walser, Mark	859	1,000	50 00
Walser, Mark	860	1,000	50 00
Walser, Mark	861	1,000	50 00
Walser, Mark	863	500	25 00
Walser, Mark	867	500	25 00
Walser, Mark	868	500	25 00
Walser, Mark	869	500	25 00
Walser, Mark	870	500	25 00
Walser, Mark	871	500	25 00
Walser, Mark	872	500	25 00
Walser, Mark	921	50	2 50
Walser, Mark	926	5,000	250 00
Walser, Mark	927	5,000	250 00
Walser, Mark, Trustee	596	500	25 00
Walker, Mrs. S. E. D. E.	375	120	6 00
Young, R.	761	328	16 40

And in accordance with law, and an order from the Board of Directors, made on the 26th day of November, 1900, so many shares of each parcel of such stock as may be necessary, will be sold at public auction at the office of said corporation, in Rooms 322-323 Parrott building, San Francisco, California, on MONDAY, the 28th day of January, 1901, at the hour of 1 o'clock P. M. of said day, to pay said delinquent assessment thereon, together with costs of advertising and expenses of sale.

J. C. ANTHONY, Secretary.

Office—Rooms 322-323, Parrott building, San Francisco, California.

POSTPONEMENT.

By order of the Board of Directors, the day of sale of the above delinquent stock has been postponed to MONDAY, the 11th day of February, 1901, at the hour of 1 o'clock P. M., at the office of said corporation in Rooms 322-323 Parrott building, San Francisco, California. J. C. ANTHONY, Secretary.

DELINQUENT SALE NOTICE.

SILVER KING MINING COMPANY.—Location of principal place of business, San Francisco, California; location of works, Pioneer Mining District, Pinal County, Arizona Territory.

Notice.—There are delinquent upon the following described stock, on account of assessment (No. 22) levied on the 13th day of December, 1900, the several amounts set opposite the names of the respective shareholders, as follows:

Names.	No. Cert.	No. Shares.	Amt.
Geo. C. Hickox	7285	5	$1 25
F. A. Berlin	7286	5	1 25
Paul A. Ryman	7338	100	25 00
Paul A. Ryman	7339	100	25 00
John Turnbull, Trustee	7357	100	25 00
John Turnbull, Trustee	7358	50	12 50
J. W. Pew, Trustee	7375	100	25 00
J. W. Pew, Trustee	7376	100	25 00
J. W. Pew, Trustee	7377	100	25 00
J. W. Pew, Trustee	7378	100	25 00
J. W. Pew, Trustee	7379	100	25 00
John W. Pew	7395	5	1 25
F. Avery	7396	5	1 25

And in accordance with law, and an order from the Board of Directors, made on the 13th day of December, 1900, so many shares of each parcel of such stock as may be necessary, will be sold at public auction at the office of the company, No 310 Pine street, room 36, San Francisco, California, on TUESDAY, the 19th day of February, 1901, at the hour of 1 o clock P. M. of said day, to pay said delinquent assessment thereon, together with costs of advertising and expenses of sale.

J. W. PEW, Secretary.

Office—310 Pine street, room 36, San Francisco, California.

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WILL DO IT FOR YOU.
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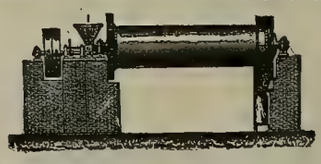

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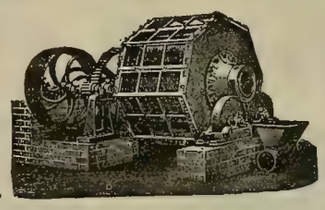

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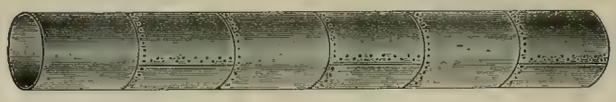

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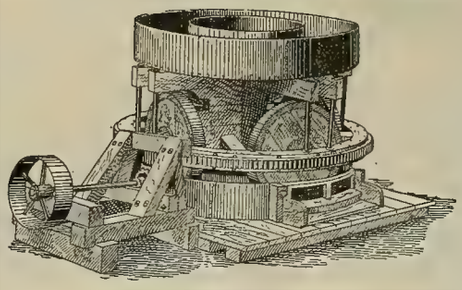

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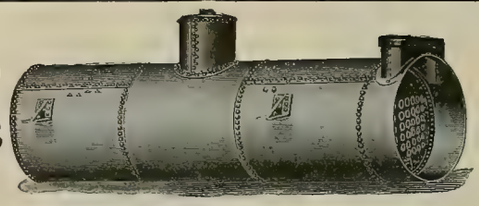

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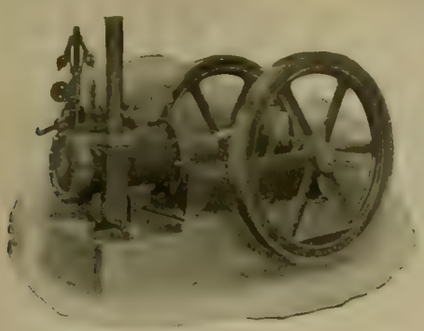

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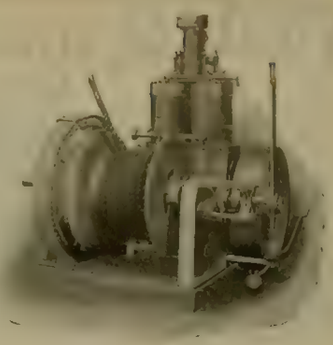

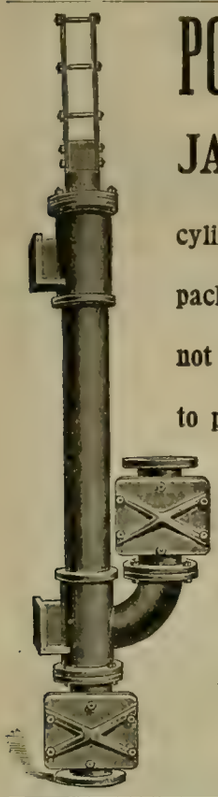

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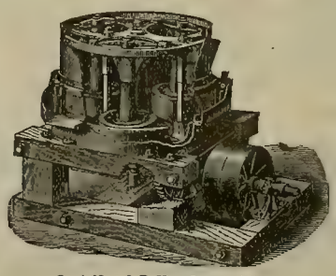

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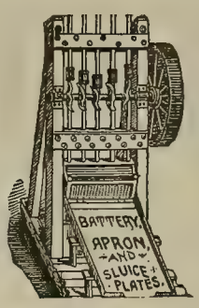

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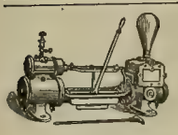

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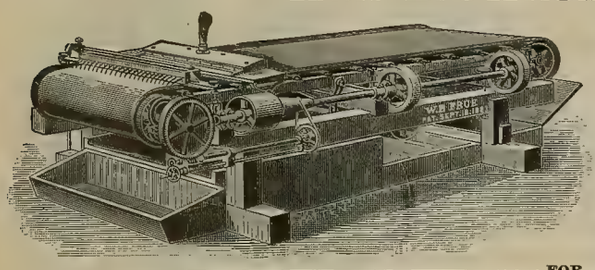

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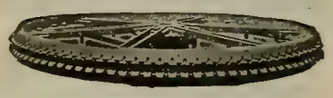

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Whole No. 2117.—VOLUME LXXXII. Number 7. SAN FRANCISCO, SATURDAY, FEBRUARY 16, 1901. THREE DOLLARS PER ANNUM. Single Copies, Ten Cents.

An Automobile on an Adobe Road.

"Yes, that looks all right here, but I'd like to see one of those concerns try to go along one of the roads up our way," was the comment of a Colusa county man recently on Market street, San Francisco, as he saw an automobile speeding swiftly up the asphalt pave. Automobiles have become so common now in many of our larger cities as to no longer attract universal attention, and their beauty, use and economy are being generally recognized. But in the minds of many exists the belief, as expressed by our Colusa county friend, that while they are all right on a city pavement, they would be only objects of vexation and derision on the bad country roads. To dispel such belief, we have had engraved the accompanying illustration of what may be styled "bubbling" under difficulties through adobe mud in Lake county, California. It is not a fancy sketch, but an actual photograph of the experience of an automobilist in a trip through northern California last November. The picture tells its own story and does not require any elaboration. The trip covered a distance of 120 miles from Ukiah to Sausalito, and was made in eight hours by P. F. Rockett of San Francisco on Nov. 29, 1900. Fifty miles of the 120 were traveled after nightfall. It will naturally occur to one looking at the picture that a machine that can shove through such roads is a good one when better bits of thoroughfare are reached, and that an automobile that can carry one at the average rate of 15 miles an hour over a rough country in darkness and daylight will win its way to popular use anywhere that wheels can traverse. The photograph from which the accompanying illustration was engraved was furnished by the Locomobile Company of the Pacific, 1255 Market street, San Francisco, and portrays one of that company's machines.

Automobiling Through Adobe Mud, Lake Co., Cal.

In this era of consolidation to destroy competition it is of note that the metal mining industry is one that encourages and supports all others and competes with none. A new factory competes with established factories; an additional farm tends to lower prices of farm products; another store cuts into the trade and profits of existing ones; the gold miner, alone, enriches all and competes with none; he, of all pursuits, creates the real wealth, patronizes every other establishment, and, producing nothing that he can consume, affords the best home market for the products of others. The amount of his purchases depends on the amount of mineral development. His work sets in motion and sustains a legion of other industries, all operating to the common good. As a promoter of railroad traffic, as a sustainer of farms and workshops, as a creator of new enterprises, as a customer for manufactures of all kinds, the miner is the best purchaser, vivifying a wide circle of activities. It has been calculated that each underground miner affords employment for ten men above ground, thus putting in motion industrial waves on which ride to profit the merchant, manufacturer, farmer and railroad man. He asks for little, but self-interest suggests to every business man in every capacity that anything that aids the mining industry aids his own business. The value of the miner's patronage is manifest. Whatever helps the miner helps all; whatever represses the mining industry injures to that extent the welfare of the nation. The miner needs no subsidies, concessions, or anti-trust legislation; he does need, however, to have his importance more generally recognized. Were it not for the miner one-half of this entire nation would still be a wilderness and the other half filled with people preying upon one another in the struggle for existence. The miner has created the greatest home market in the world and is thus the foremost factor in all commercial development. When the miner has money to spend everybody in his vicinity is prosperous. And the truth of these patent facts should be recognized in the legislature of every mining State and Territory.

Country Across Which El Dorado, Utah, Aerial Tramway Was Constructed.

Some Difficulties of Construction of El Dorado, Utah, Aerial Tramway.

(See Page 93.)

MINING AND SCIENTIFIC PRESS.

ESTABLISHED 1860.

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San Francisco, February 16, 1901.

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THE most gigantic trade combinations in human history, now forming, offer as their most noticeable figure the fact that the mining industry is the base. The most recent Eastern combination of capital represents $2,490,942,358; of this vast amount $862,943,358 is credited to coal mine and allied railroad interests of the Morgan syndicate, $835,000,000 to the Rockefeller oil and mine properties, and $793,000,000 to the steel combine.

THUS far there has been no combination of all Pacific coast smelting interests. A British Columbia report, which appears to be confirmed by private advices, is to the effect that four smelters of that Province have combined under the name of the Granby Con. S. & M. Co., Ltd.; capital stock, $15,000,000. In the absence of details, it is to be assumed that the same idea actuates the formation that previously suggested similar combination in Utah, Colorado and Kansas, viz: centralization of interests and economy of operation.

ON Dec. 15, 1897, the Commissioner of the General Land Office made the following ruling: "In applications for lode claims where the survey conflicts with the survey or location lines of a prior valid lode claim, the ground within the conflicting surveys is excluded; the applicant not only has no right to the excluded ground, but he has no right to that portion of any vein or lode the top or apex of which lies within such excluded ground." This month the Secretary of the Interior, overruling a ruling of the General Land Office Commissioner, decides that certain parts of mining location lines may be laid within or upon other patented lode claims, and mining improvements may be placed upon adjoining public or private land actually claimed, "so long as private properties do not complain."

THE fourth session of the International Mining Congress is announced to convene at Boise, Idaho, July 23, 1901. The original idea of the Congress was an excellent one, and the Denver and Salt Lake sessions were of value; but there is a lack of coherence and interest that does not augur well for its continuance. The Milwaukee meeting was of no avail. If real mining men could continue to believe that their attendance would be productive of benefit they would attend even at some personal sacrifice; but the average miner is too busy a man to go a thousand miles to listen to essays by people who do not know what mining is. If a suitable programme is prepared with reasonable assurance that it will be followed, and it can be made to appear that the "Congress" will be of any practical benefit to the mining industry, miners will help make it a success. Otherwise, herwise.

Stamp Mill Practice.

The extended monograph "Stamp Milling of Free Gold Ores," which as written and illustrated by Mr. Harmon, of Nevada Co., Cal., appeared in its entirety in the issue of Dec. 1, 1900, has, as we expected, attracted unusual attention among millmen. Copies of the issue containing it are exhausted. Numerous criticisms and comments have been received, mostly endorsing the stand taken, though differing from the author in some details. As was said editorially, at the time, the article was not at all "orthodox" in its statements and went against some tradition and precedent. In this issue begins a series of articles on the same general subject by Mr. A. W. Warwick, formerly of California, now of Leadville, Colo. In the article on page 95 he takes issue with Mr. Harmon on the subject of stamp mill foundations, a subject to which some previous attention has been given herein. In next Saturday's issue will appear the second of Mr. Warwick's series—"Power Required by Stamps"—which goes into that subject with unusual minuteness of detail. The whole subject is one of practical importance and personal interest to millmen everywhere. The fact that stamps are of such universal and continued use, and that despite all their faults and the introduction of other crushing devices they continue to be in popular favor, justifies such extended discussion of economy and exactness in stamp mill practice. As one millman writes, regarding the whole subject, "I believe that in building and operating stamp mills the day of rule of thumb is over, and that to make needed improvements we must constantly test and apply instruments to find out what we are actually doing, and not rest content with guessing at it." In the article in the present issue it will be noted that Mr. Warwick is something of an iconoclast himself, and in the succeeding articles of the series it is even more in evidence that he is ready to question any statement, however apparently authoritative, where such statement does not appear to run in parallel lines with actual facts as have been demonstrated by repeated and continuous practical experience.

THE fact that the demand for platinum is increasing, that that rare metal was never before worth so much as at present, and that its sources of supply are exceedingly limited, should act as an incentive to Pacific coast miners and prospectors to make tests wherever it would appear probable that it is present. It is not found anywhere on this coast "in place;" nearly always associated with placer gold, and on this continent is only found in any commercial quantity on this coast. It is not infrequent in the northern counties of California, ordinarily in rocks closely related to serpentine, generally in thin scales, rounded granules or irregular grains from microscopic size to ¼-inch diameter, and of all grades of purity. Chromic iron is always abundant in platiniferous gravels, both as sand and pebbles. It is not uncommon to find native gold and platinum firmly welded together and with a well-defined line of junction. Ordinarily, where found, the quantity of platinum in the gold contents of gravels is one-fifth to one-half of 1%, though in some cases of gold-bearing black sand on the California and Oregon coast the platinum formed 40% by weight of the gold contents thereof. Platinum is found from San Bernardino county, Cal., along the coast line to the Similkameen district, B. C., where, 120 miles south of Kamloops, near the headwaters of the Tulameen river, are the present richest deposits of the metal. In the Tulameen or Granite Creek district the platinum grains are black and magnetic; the platinum sand of the Similkameen is bright. A well authenticated report from that district is to the effect that a small nugget of platinum found therein had a considerable amount of the mother rock attached thereto, a periodite mixed with chromite and magnetite. It is probable, should platinum be found "in place" anywhere on this continent, it would be in that vicinity. The unconcentrated sand of the Saskatchwan river, 60 miles above Edmonton, B. C., has assayed three one-hundredths of an ounce of platinum per ton. It is also found associated with the placer gold of the Caribou district, 250 miles north of Ashcroft, B. C. With its sister metals, osmium and iridium, its present enhanced value makes it worthy the attention of placer gold miners

Trade Treatises.

Through the years this paper, under the head of "Catalogues Received," has noted the salient points of illustrated descriptions of apparatus and machinery sent to this office by manufacturers and dealers, but of late the handsome brochures sent are deserving of a more appropriate title than the term "catalogue," which really means only a list or enumeration of names of things with slight explanatory addition. Accordingly, in future, the heading "Catalogues Received" will be discarded, and the more appropriate one of "Trade Treatises" used in weekly notice of the sumptuous productions that find their way to our desk. Many of those treatises are of unusual value. They give considerable technical information; they are up-to-date in modern mining and metallurgical practice; they are embellished with costly drawings finely engraved and are printed on expensive paper, in many ways being as far ahead of the "catalogues" of a generation ago as an arc light is ahead of a candle. The old "catalogue," meager of information and with a few cheap cuts printed on poor paper, is superseded by a gem of typographic art, the trade treatise, embodying the best and brightest in art, the knowledge of the expert and the experience of the practical manufacturer, giving such detail as to cost, construction and applicability as to enable the prospective purchaser in the most remote locality to form a fair idea of what he needs, how it looks, and what it will cost at the factory.

More than ordinary notice is devoted to this matter because many of those treatises deserve it. The technical information is usually correct, the tables and details have all been worked out carefully and are often the result of years of experience; the "fine writing" and padding is all cut out, and nothing but the essential details appear, they being models of brevity; the illustrations are often superior to those in the first-class magazines and illustrated papers, and such superiority is only secured at great expense. In one received this week are forty-three engravings, some of which in their finished form must have cost $60 each. They are characteristic in every way of progressive mining and metallurgical industry, and, as such, are to be commended.

CURRENT statement is made of a recent discovery in an eastern Oregon gold mine of a vein 25 feet wide in which from a "streak" of ore 12 inches in width "several chunks of ore, each as large as a man's head, have been taken out, which yield one-third gold." With no more than passing reference to the statement, which may or may not be true, it is a matter of record that a rich ore streak will produce great store of treasure from a very small space. Over $2,500,000 has been taken from a space "the size of a three-room cottage." From one little "pocket" in the Moose mine, near Alma, Colo., about $1,500,000 was taken. The same holds good regarding several gold deposits in Placer, Tuolumne and other California counties. The Rhodes claim, near Murphys, Calaveras county, Cal., produced $250,000 from an area 40x100 feet; ninety pounds of gold were taken out in twenty-four hours. A similar area in the Jamieson claim, Iowa Hill, Placer county, Cal., yielded over $500,000; the Dardanelles claim, Forest Hill, in the same county, yielded $2,000,000; near Springfield, Tuolumne county, Cal., single miners' carloads of "pay dirt" panned out $1000 each. This constitutes one of the charms of mining. Development of a "prospect," proper working of a "mining claim," may make each of its 1500 feet worth more than the most valuable 1500 feet front of property on Broadway, New York.

THERE is such a thing as being too previous, even with an improbable possibility, and the twenty-second century ideas being advanced by some scientists in these first weeks of the twentieth century do not tend to increase popular regard for scientific utterances. Tesla, as usual, pops up with a positive statement that he has established communication with the planet Mars, and a Chicago scientist is out with a discovery which consists in "reducing coal to a gaseous form, sending it through the air on a wireless electric circuit, to be reduced at its destination to a solid coal with all its original properties." This is a little in advance of the ordinary procession of new ore processes, wave motors, etc.

Concentrates.

NO PARALLEL end lines no extralateral rights.

THE maximum grade adopted on the U. P. R. R. is 43 feet per mile.

THE standard sizes for trade catalogues are 3½x6 inches, 6x9 inches and 9x12 inches.

ABOUT 65% of the present gold output is by means other than the hydraulic processes.

MINE SURVEYING does not count as development work in annual assessment work required.

AIR is soluble in water at ordinary atmospheric temperature and pressure to the extent of 1.78%.

IT is possible to frame a block of such shape that it will fit either a round, square or triangular hole.

"MINERAL" is any substance—solid, fluid or gas—obtained by mining or digging under the surface, except water.

NO "mineral rod" or "divining rod" will locate gold or silver ore; these metals do not act upon a magnetic needle.

FULLER'S EARTH is found near Bakersfield, Cal., and other points on the Pacific coast, and is used for clarifying oil and refining petroleum.

THE cost of teaming freight between Red Rock, Montana, and Salmon City, Idaho, 70 miles, is understood to be 20 cents per ton per mile.

THE Missouri-Kansas zinc shut-down is to decrease production. A large percentage of English importation of zinc ore has been from Colorado.

WHERE two or more veins unite, the oldest or prior location shall take the vein below the point of union including all the space of intersection.

THE Utah courts have decided that a mining company therein could condemn land over which to construct a pipe line to convey water to its mine.

WHAT we call a natural law is merely that we have discovered the way a natural force acts, and have stated in exact language its habit of procedure.

THE percentage of gold in hard amalgam is usually in direct proportion to the temperature of the pulp, a little more mercury being required in winter.

THERE is no anthracite coal on the Pacific coast so far as known. There is a limited anthracite coal area in Colorado, and a still more limited one in New Mexico.

DISCOVERY and appropriation are the sources of title to mining claims, and development, by working, as condition of continued ownership until a patent is obtained.

CINNABAR is the most common source of quicksilver. What mineralogists call metacinnabarite and tiemannite (mercuric selenide) also exists, the latter in Piute county, Utah.

IN 1900 there were in California nineteen productive quicksilver mines, fifteen in course of development, forty-one furnaces in operation, and about 1300 men employed.

PAN AMALGAMATION is completely successful in the case of chloridized silver, but only partially successful for the "free milling" silver combinations with sulphur, antimony and arsenic.

THE last three bulletins of the California State Mining Bureau, Nos. 18, 19 and 20, were issued toward the close of 1900. A compilation of their contents has already been published in these columns.

ACETYLENE does not at first burn with a smoky flame, but after 300 hours smoke is formed, the burners attaining a temperature higher than that of the decomposition of the acetylene, the gas decomposing into carbon and hydrogen.

THE Idaho placer location law requires that the locator must place a post or monument at each corner, and, within fifteen days after locating, must make an excavation measuring at least 100 cubic feet for the purpose of prospecting.

THE Russian standard of weight is the pound 409.512 grams. A pood is 40 pounds, 16.30 kgs. The verde is the unit of liquid measure; it holds 30 pounds distilled water at 16.6° C. The archine is the unit of length, equaling 71.12 centimeters.

THEORETICALLY, there is no obstacle to working mines 12,000 feet deep. Mines 5000 feet deep are now being worked, and the other 7000 feet could, probably, admit of a vertical shaft with intermediate landings and separate hoisting engines—a winze on a large scale.

WHERE the locator of a mining claim on Government land fraudulently antedates his location for the purpose of defeating an actual locator on same, such location is fraudulent as against the rightful claimant and also the Government.

IN California a mining claim location must be filed by the locator, in the office of the recorder of the county in which the claim is, within thirty days after the time allowed by law in which to do the annual work upon the mining claim shall have expired.

THE Rio Tinto, Spain, copper mine pays the larger part of its dividends from its by-products, the pyrites averaging 48% sulphur. Sulphur is procurable from such big concerns as the Mountain Copper Co., at Keswick, Cal., and the Anaconda Co., Butte, Montana, but while procurable the product is not entirely commercially profitable, and for this reason most of the sulphur is mainly allowed to go to waste.

UNDER the U. S. law but one timber claim and but one pre-emption or homestead right can be taken; the only limit to the number of mining claims located by one individual or company is the ability to do sufficient annual assessment work on or for each claim to hold them.

TORTA in Spanish America is the usual word for omelet. It is literally a cake, and "of eggs" is implied. But the miners use it specifically for the "omelet" of wet ground ore seasoned with the necessary chemicals to assemble the silver. In looks it is simply a stupendous mud pie.

PHOSPHATE of sodium has been used with success in keeping mercury in good condition for amalgamating purposes. Unlike metallic sodium it forms no combination with quicksilver. An article on page 42 of the issue of Jan. 13, 1900, goes into this whole subject in a practical way.

BISMUTH is produced in commercial quantities in the Ballard and Penn mines, in Leadville, Colo. It is bought by two Denver firms, to be shipped to Liverpool, where an English firm controls the world's output. The demand is light; probably 100 tons of the refined metal would supply the requirements of this continent for a year.

A "FOOT" of water is understood to be the amount that will flow through an opening 1 foot square under 4 inches pressure, or 1 cubic foot per second flowing through an opening of 50 square inches. A ditch 6 feet wide at the top, 3 feet bottom, 3½ feet deep, will carry from 2500 to 2800 miners' inches water, according to its grade.

TELLURIUM may be distinguished from selenium by the peculiar "horse-radish" odor of the latter when heated. In an acid solution of tellurium oxide sulphuric acid immediately produces a brownish precipitate of tellurium sulphide, soluble in ammonium sulphide, its color distinguishing it from any other metallic sulphide soluble in ammonium sulphide.

THERE are many tests for gold. Among the simplest is to pulverize the ore very fine, and in a test tube treat it with one part nitric and four parts hydrochloric acid, allowing the liquid to stand where it will be well warmed for about fifteen minutes till it becomes clear. Then let a small drop of chloride of tin fall into it; if a purple flash of color be instantly produced gold is present.

THE United States requires that all boilers built for marine purposes shall have all the rivet holes in the shell fairly drilled instead of punched, the longitudinal laps of the cylindrical parts double riveted, to be entitled to 20% additional pressure, and no solid or hollow screw staybolt can be used in a marine boiler in which salt water is used to generate steam, unless the bolt is protected by a socket.

IT is not unusual to find oxidization of gold ore to considerable depth, so that there is practically no sulphurets or pyrites in the ore, it being free milling throughout. The Yellow Aster mine, at Randsburg, Kern Co., Cal., affords example of such a case, where at a depth of over 800 feet the ore is reported to be almost entirely devoid of sulphurets and no concentrating is necessary. The mine is also reported to have "not a drop of water in any of its workings," which is, also, an unusual feature.

A 1% SOLUTION of pure cyanide will dissolve a given weight of gold in ten minutes; but the addition of one-one-hundred-thousandth part of sulphur, as a sulphide, to that solution will extend the time to two hours to dissolve the same weight of gold. An abnormal consumption of cyanide is usually associated with low extraction of gold. To reduce a 1% solution to ¾ of 1%, use 3 ounces solution to 1 ounce water; to ½ of 1%, 2 ounces solution to 2 ounces water: ¼%, 1 ounce solution to 3 ounces water; ⅛%, 1 ounce solution to 7 ounces water.

GOLD-IRON amalgam occasionally forms, for though mercury and iron do not directly combine, iron is susceptible of amalgamation by sodium amalgam, and where the latter is used in cleaning up iron may be slightly amalgamated in spots. Amalgamation of iron is also noted, at times, in pan amalgamation, where copper and salt are employed. Where arsenite of iron is in the ore, if calcium, sodium and magnesium chlorides were in the mine water used for milling there would result a considerable percentage of iron in the amalgam.

AN "ipse" sale of mining stock in a mining stock exchange is a sale of stock made by a broker to himself, and is distinct from a "wash" sale. A broker may have an order from B to buy 500 shares of Copper Jack, and an order from C to sell 500 shares Copper Jack at the same figure, and by an "ipse" sale sells the 500 shares to himself for the seller, and earns—that is, charges—two commissions. His argument is that it facilitates business for his clients. In the Exchange he has to bid to within one-eighth of the price that he can pay, and has to offer the stock within one-eighth of the price at which he can sell. It is skating over thin ice, but is done.

AT any time prior to the issuance of a U. S. patent for a mining claim or piece of mining ground, protest may be filed against the patenting of the claim as applied for, upon any ground tending to show that the applicant has failed to comply with the law in a matter which would avoid the claim. Such protest can not, however, be made the means of preserving a surface conflict lost by failure to adverse or lost by a court judgment in an adverse suit. One holding a present joint interest in a mineral location included in an application for patent, who is excluded from the application, so that his interest would not be protected by the issue of patent thereon, may protest against the issuance of a patent as applied for, setting forth in such protest the nature and extent of his interest in such location, and such a protestant will be deemed a party in interest entitled to appeal.

THE ore of the Mountain Copper Co. at Keswick, Cal. averages iron 38, copper 8, zinc 4, sulphur 46, sulphur dioxide and trioxide and aluminum trioxide 3. The ore, which is a chalcopyrite, has about 1½ ounces silver and 0.03 ounce gold to the ton. There is a trace of arsenic. It manifestly roasts and smelts well. The ore is roasted in huge heaps in the open air, liberating about one-third of its total weight in sulphur, the residue going to the smelters, producing a matte of about 40% copper, which is shipped to the Atlantic coast for refining. It is understood that there is a profit to the company of about $2.75 on each ton of ore treated. About 200 tons of sulphur are daily burned out from the ore heaps, roasting in the air.

HOW metals gather in veins where miners find them is a constant subject of scientific discussion. As to the scheme suggested, viz: "in a copper mine where the richer bodies of ore have been taken out and the remaining copper is scattered in small particles through the rock, the rock too poor to work at a profit in the ordinary way, by flooding the mine with water, adding acid, if necessary, inserting widely separated electrodes and turning on the current of a powerful dynamo, to cause the copper scattered through the lean rock to gather where it can be gotten at," it might be made the subject of experiment at the expense of the experimenter, though it is believed that the result would be more interesting than prosperous.

A WING DAM is employed in mining the water-covered bed of a river where it is impracticable or undesirable to divert the water from the entire bed. It extends out from one side of a river part way across the stream, crowding the full flow to the unobstructed side. Usually it is built out about half way across the river, then turned down stream and parallel to the bank till it includes within it the portion of the river bed that is intended to be mined, then, turning toward the river bank from which it started, it tightly completes the inclosure against inflow from the river. It generally includes only so much ground as it is calculated can be worked out before a rise in the river overwhelms and tears out the dam, it being but a temporary structure.

FOR determination of lead in lead ores, weigh one gram of the ore, if rich, more if poor, into a platinum dish, cover with a watch-glass and add 40 or 50 cc. of a mixture of one part sulphuric acid (sp. gr. 1.84) and three parts nitric acid (sp. gr. 1.42). Heat the covered dish on a hot plate until the action of the acid on the ore has apparently ceased. Then remove the watch-glass and rinse into the dish. Add 10 to 15 cc. of hydrofluoric acid to the solution in the dish and evaporate until dense white fumes of sulphuric acid begin to come off. It is better to conduct the evaporation under a hood for obvious reasons. Remove the dish from the source of heat and cool. Dilute to about 100 cc. with water, digest until all soluble salts are in solution and filter, washing first with a 2% solution of sulphuric acid and then with alcohol. Dry, detach the precipitate from the filter paper, burn the latter in a small porcelain crucible, then add the precipitate and ignite. Weigh as lead sulphate and calculate per cent of lead in the ore.

BY the term "veins" or "lodes," as used in the mining acts of Congress, is meant lines or aggregations of metal embedded in quartz or other rock in place; both are intended to indicate the presence of metal in the rock. But it is not enough that there may be some indications by outcroppings on the surface of the existence of lodes or veins of rock in place bearing cinnabar or other metal to justify their designation as "known" veins or ledges. A "vein" or "lode" is not known to exist until it has been discovered and located—that is, that its boundaries have been specially marked on the surface, so as to be readily traced, and the notice of location is recorded in the mining district or county in which it is situated. It follows, therefore, that a vein is not "known to exist" in law except by an actual discovery of the vein within a given location. The existence of the location is a matter which every one is legally presumed to know. The existence of a "mine" is not known until ore has been extracted or shown to exist in sufficient quantities and value to warrant extracting within the boundaries of the claim located; until then the location is a "prospect," and the mere existence of shafts, tunnels, inclines and stopes on the vein, no matter how extensive such excavations may be, is not evidence of a mine of value; or, in other words, a "vein" is the work of nature; a "mine" is the result of man's handiwork in disclosing the mineral contained in the vein. A "known mine" may be said to be one which is especially recognized by the natural material having been made visible and productive through workings or exploration, and not until then is it a "known mine" within the meaning of the statute. The term "mine" is generally equivalent to a "worked vein," for by working the vein it becomes a mine. The U. S. statutes intend that a "known" mine should be synonymous with an operated mine.

A New Mining Region.*

Written for the MINING AND SCIENTIFIC PRESS by DON MAGUIRE.

Hitherto mining in Utah has been confined to that part of the State lying south of a line drawn from east to west through Salt Lake City. The two Cottonwoods, Bingham, Ophir, Camp Floyd or Mercur, Stockton, Marysvale, Frisco, Park City, Dry Canyon, Silver Reef, American and Luck canyons are the names that off and on for thirty years have been known as the mining districts of Utah. The new century opens with a new locality for mining in this State, comprising a great part of Box Elder county.

The area of Box Elder county, Utah, comprises about 6000 square miles, a large part of which is mountain, lake and desert. In the northwestern part of the county, in what is known as Park valley, a number of gold veins have been discovered during the past two years, and there is now running on one of these properties, owned by Dr. Kurg of Salt Lake, a small quartz mill which turns out a gold brick valued at $1000 every week. The success that has attended the building and operation of this little mill is now encouraging other property holders there to develop their claims and construct other mills than the one now running.

The veins in Park valley are strong quartz veins, with clear, distinct walls in granite and porphyry and also in slate, which latter formation is the cap rock of much of that locality. Park valley lies about 15 miles northwest of Kelton, a freight station on the U. P. R. R. The mountains there are less than 8000 feet above sea level and comprise a part of what may be termed the Kelton range; abundant grass, fuel and water are found there, and at present about 100 locations have been made in the district. The work so far done does not do justice to the promise of the veins exposed, and when capital and experience within the next two years are brought to bear upon Park valley it will become one of the active producers of Utah.

North and west of Brigham City, in the main range of the Wasatch, a number of good properties running high in gold, silver, lead and copper are held by local prospectors, and many of them if vigorously worked would no doubt become good mines. In this part of the county, north of Brigham City, there is a mine known as the Gold Consolidated. It is a large group, and on it about $160,000 has been expended. There seem to be very large bodies of high-grade ore there, but as yet but a small tonnage has been worked from this mine; the management is in the hands of Colonel Baker of Ogden and Chicago.

The pivotal point, however, of mineral wealth in Box Elder county centers in Sierra Madre mountain, one of the highest mountains of the Wasatch Range and which rises north of Ogden about 12 miles and 7 miles south of Brigham City. This mountain is bold and rugged; its steep sides and western slope rise up almost perpendicularly and expose one of the most interesting series of formations to be found on the American continent. Deep, black canyons, running far into the granite measures and needle-like pinnacles, rise up thousands of feet into the cold, bleak atmosphere of the higher regions; a stunted growth of fir and scrub pines clothe the north slopes of its deep gorges, and near the summit, where the blue limestone belts lie, a limited number of monster red firs are scattered along the mountain for a distance of about 4 miles, and their twisted and gnarled boughs show the effects of as much as five centuries of battling with the elements. So little has man visited this high and lonely solitude that, although within 50 miles of Salt Lake City, the big horns, or mountain sheep, still find a home there, and the mountain eagles have hitherto nested in its aeries as the last one spot where man's foot was never to tread.

The formation of this mountain near its base is granite or syenite and gneiss, also porphyry. Midway toward the summit lies a belt of Cambrian or Weber quartzite, 1800 feet in thickness, on the upper contact of which rests a measure of clay slate, and capping that about 900 feet of Carboniferous limestone; above this a measure of chloritic schist, and still above this a third measure of the later quartzites.

The ores existing in this mountain are gold, silver, copper, lead, zinc, antimony, iron, nickel, cobalt, molybdenite and uranium.

The chief ore bodies so far discovered are in very prominent gold-bearing fissures in the gneiss measures and silver-bearing lead ores in the Carboniferous limestone and clay slate near the summit of the mountain. For thirty years the precious metals were known to exist here, but it was only in 1897 that vigorous steps were taken to develop the mineral veins that rise there to the surface.

In 1897 the first work of opening the King Solomon vein was begun, and the following year the El Dorado vein was worked upon. This El Dorado vein is a gold and silver-bearing lead vein, lying between clay slate and blue lime, and in places sending immense bodies of ore into the blue lime above. The lead existing here runs from 20% to 85%, silver to the value of thirty ounces and from 2 to 6 dwts. gold.

This vein, where it is now being worked in the El Dorado, is from 5 feet to 17 feet in thickness and lies almost like a blanket vein, dipping into the mountain at a pitch of about 14° and rising with the country from N.W. to S.E. almost 4 miles, the entire length of which shows values sufficiently high to make it pay for working.

The El Dorado mine is situated on the west side of Sierra Madre mountain, about 900 feet below the summit, known as El Dorado peak. The King Solomon fissure breaks up through the quartzite into the slate and lime at this point, and seems to unite with the El Dorado flat vein.

At this point there seems to be a sort of mineral axis from which radiate forth the strong lines of either vein, and at the point where work began on the El Dorado clear bodies of silver-bearing lead ore that runs 70% lead to the ton comes clearly to the surface, continuing in strength and richness as work goes down, until at a depth of 250 feet from the mouth of the incline the vein presents one of the strongest and most beautiful ore bodies ever opened in any mine. Within the last twelve months about 800 feet of work has been done on the El Dorado, chiefly in sinking an incline and running lateral drifts on the ore body to the right and left from the main incline.

At the face of the incline, 250 feet from the adit, copper, in the form of chalcopyrite, begins to show in the clear galena, and conditions would indicate the rise of considerable of this metal in the working of this vein as depth is gained. At present writing there is considerable ore exposed in the El Dorado workings in a small area, when compared to the extent over which the well-defined ore bodies may be traced along the mineral zone.

The most discouraging feature of these mines was the conditions existing when work of development first began. For a distance of more than 9000 feet the surface of the country and approaches presented a succession of steep cliffs and precipices; points hundreds of feet apart had to be united by building up masses of masonry and by hanging bridges, and at other points immense bodies of quartzite had to be blasted away—and all this to construct a good pack trail for a donkey train.

In the spring of 1900 work on the construction of an aerial tramway began. To install this the work was doubly difficult. The illustrations on the front page portray the difficult character of the country through which this line was built. Several months were required in its construction. The pattern of tramway placed here was the Hallidie, furnished by the California Wire Works of San Francisco, Cal., and it was only in the last days of December that it was put into commission, carrying down ore from the El Dorado mine to the foot of the mountain.

I send you herewith two photographs showing the kind of country referred to, over which the El Dorado tramway has been built.

The ore thus transported over the line is divided into three classes—first, second and third. First and second class ores may be treated by smelters without further handling, but third class ore must be concentrated, as the lead value falls to a percentage of from 15 to 25.

The nearest railway point from the lower end of the tramway is at Hot Springs, 2 miles away, on the O. S. L. R. R., and also the U. P. R. R.; from the Hot Springs to the smelters south of Salt Lake City the distance is 52 miles and the freight rate $2.50 per ton; for transportation by rail from the end of the tramway to the railroad the cost of transmission by wagon is 60 cents per ton, and the cost of transmission over the tramway is 17 cents per ton; in all it costs $3.27 to land ore from the mine to the smelter. Adding smelter charges to the above, the ores from the El Dorado, with lead at $4 per 100 pounds, can earn dividends on its output. The other mines of this mountain are the Vulture, Santa Maria Consolidated, the Uwanta Group, Cashlings, Blue-Eyed Nellie, Defiance, Manila, Sampsons, Aguinaldo, Ben Hur, Bengal Tiger, Broken Bow, King Solomon, Eulalea and Kilkar. The above groups are owned mostly by men who are quite able to develop them, and the summer of 1901 promises to see Sierra Madre mountain one of the most interesting and profitable in the State of Utah, considering the amount of money so far spent upon it.

At the foot of the mountain and at its west base, overlooking Great Salt Lake, lies a little town just springing into life, called Lagansville, named in honor of Dr. John Lagan, a resident of San Francisco, who has been one of the strong forces in the development of this mountain. The town as yet is in its infancy, comprising the necessary buildings constructed by the El Dorado G. M. & M. Co.

As to Sierra Madre mountains' future there can be but little doubt. In the properties now located there are seven fissure veins, one blanket vein, three lenticular veins, and of the above eight carry gold alone and the others show values in gold, silver, copper and lead. The locality in its geological make-up is an ideal one for strong mineral veins, and for mineral values in silver, lead, gold and copper its upper measures are counterparts of the region in and around Batapilos in Mexico and also that of Zacatecas. At Cottonwood, in the same range, 30 miles from Salt Lake City, where the same measures extend and where similar surface conditions exist, $17,000,000 has been taken in thirty years from a less area than that contained within the lines of the El Dorado property.

The district thus known as the Sierra Madre mining district, so lately brought to the notice of the world, shows what may lie at the feet of a busy hive of humanity for years without being known to be of value. Sierra Madre, like Cripple Creek, for forty years was passed by as a spot wholly unworthy of consideration as a mining country; five years hence men will tell of how in 1899 and 1900 they could have purchased for a trifle property that then shall have become the peer of present great producers.

* See illustrations front page.

Pressure of Water.

The following table shows the pressure of water in pounds per square inch for every foot in height to 100 feet; and then, by intervals, to 500 feet head. By this table, from the pounds' pressure per square inch, the feet head is readily obtained, and vice versa:

Feet head	Pressure per sq. inch	Feet head	Pressure per sq. inch	Feet head	Pressure per sq. inch	Feet head	Pressure per sq. inch
1	0.43	30	12.99	59	25.55	88	38.12
2	0.86	31	13.42	60	25.99	89	28.55
3	1.30	32	13.86	61	26.42	90	38.98
4	1.73	33	14.29	62	26.85	91	39.42
5	2.16	34	14.72	63	27.29	92	39.85
6	2.59	35	15.16	64	27.72	93	40.28
7	3.03	36	15.59	65	28.15	94	40.72
8	3.46	37	16.02	66	28.58	95	41.15
9	3.89	38	16.45	67	29.02	96	41.58
10	4.33	39	16.89	68	29.45	97	42.01
11	4.76	40	17.32	69	29.88	98	42.45
12	5.20	41	17.75	70	30.32	99	42.88
13	5.63	42	18.19	71	30.75	100	43.31
14	6.06	43	18.62	72	31.18	110	47.64
15	6.49	44	19.05	73	31.62	120	51.98
16	6.93	45	19.49	74	32.05	130	56.31
17	7.36	46	19.92	75	32.48	140	60.64
18	7.79	47	20.35	76	32.92	150	64.97
19	8.22	48	20.79	77	33.35	160	69.31
20	8.66	49	21.22	78	33.78	170	73.64
21	9.09	50	21.65	79	34.21	180	77.97
22	9.53	51	22.09	80	34.65	190	82.30
23	9.96	52	22.52	81	35.08	200	86.63
24	10.39	53	22.95	82	35.52	225	97.46
25	10.82	54	23 39	83	35.95	250	108.29
26	11.26	55	23.82	84	36.39	275	119.12
27	11.69	56	24.26	85	36.82	300	129.95
28	12.12	57	24.69	86	37.25	400	173.27
29	12.55	58	25.12	87	37.68	500	216.58

The Gardner Electric Drill.

In the issue of May 26, 1900, appeared an accurate description, accompanied by illustration, of the New Era electric drill, manufactured in Denver, Colo. The original company has since been supplanted by the Gardner Electric Drill & Machinery Co., the machine now being known as the Gardner electric rock drill. The home office of the company is in Denver, where it has equipped a thoroughly modern machine shop of sufficient capacity to turn out fifty drills per month. The right of sale and manufacture has been granted the California Electric Co., in San Francisco, for the territory embraced in California, Oregon, Nevada and Alaska. Negotiations are pending with parties in the East to provide for the manufacture of this drill in that section. It is stated at the Denver office that the Gardner drill is in operation at thirty different mines in the Middle and Western States; that it can be seen operating at the Pro Patria tunnel, Rico; the Bessie mine, Telluride; the Edgar Con. mine, Idaho Springs and other locations in Colorado; and on various properties in Wyoming, California, Oregon, Montana and Mexico. By reference to the technical description referred to full information can be obtained as to the mechanism of the drill, its weight and power required.

Cyaniding in Mexico.

TO THE EDITOR:—This republic has a "Mercur, Utah, district" as a cyanide camp in El Oro, State of Mexico, the ores being easily amenable to cyanide treatment. The El Oro Mine & Railway Co. treat 9000 tons ore per month by the cyanide process; the Esperanza Co. treat 6000; at the Mina Leanen, which belongs to the British Gold Mines, Ltd., 2000 tons per month are treated. The Mexico Mine Venture Syndicate, owners of the Mina Mexico, are preparing to treat about 3000 tons per month, a total right here of 20,000 tons per month of ore treated by the cyanide process.

All the ores in this district are found either in the contact between the andesite and slate or else in the slate proper. Cyaniding is understood very well in this district and is done in an up-to-date fashion, the slime treatment, which is done by agitation, with compressed air, being in my estimation a step in advance of the general practice in the United States.

El Oro, Mexico, Feb. 1, 1901. GRINGO.

An Aid to Gold Dredging.

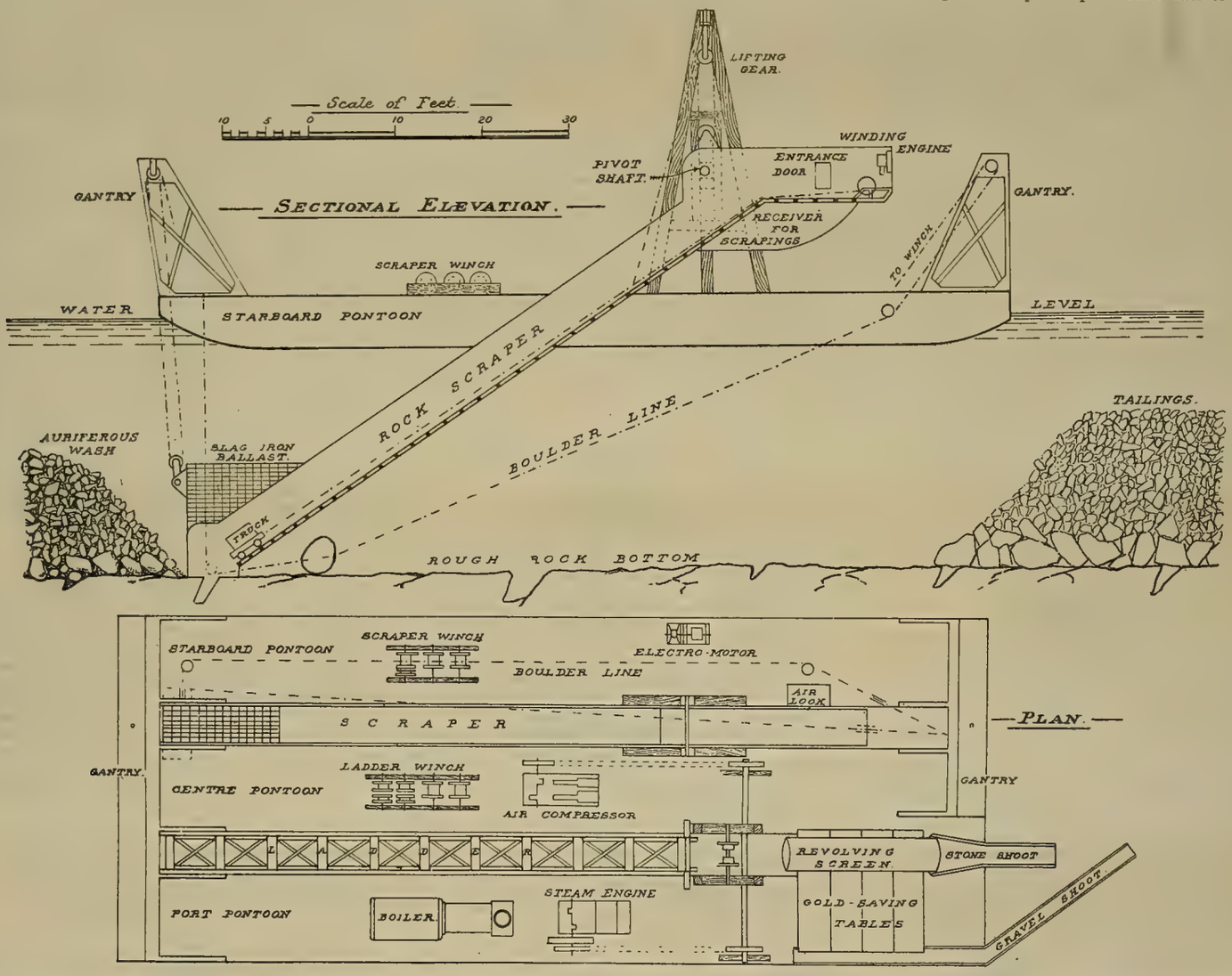
To get at the gold on the bedrock, and out of the crevices therein, is one of the things that often puzzle the operator of a gold dredger. From New Zealand, the home of the gold dredging industry, come details of a pneumatic rock scraper designed for the purpose mentioned and to assist in the removal of large rocks and stones below water level. It differs from the ordinary gold dredger in having three instead of two pontoons, thus providing two wells. One of these wells accommodates the bucket ladder, while the other well is set apart for the pneumatic apparatus, which consists of an iron tunnel swinging upon an axle, which allows the lower end or mouth of the tunnel to be raised or lowered at will, being able to reach to a depth of 65 feet. The mouth of the tunnel is enlarged to a size sufficient to cover a boulder and allowing the workmen to work around it. The water is expelled and kept out of the tunnel by pneumatic pressure, and when the bottom is reached, or at any other stage of the work, the men enter the tunnel to do whatever may be required, whether it be the removal of stones or scraping up the bottom. To raise any material to the deck of the pontoons a truck running on rails, as shown in the accompanying engraving, is used. The tunnel is supplied with electric light, and telephonic communication is provided between the men at the bottom and those upon the deck of the pontoons. The scrapings off the bottom are landed in a receptacle provided for the purpose.

Work is begun by setting the bucket belt in motion, and when a boulder is met to obstruct the work the ladder is raised, the dredger shifted sideways, the pneumatic tunnel lowered, and the men go down to remove the obstruction. When bottom has been reached and a sufficient space cleaned the same process is repeated. Men descend, when the tunnel has been lowered to the rock and the water expelled, to clean out the crevices, sending up the wash and gold in the truck.

There is the objection that in swiftly flowing rivers the rock, when cleaned up by the dredge buckets, will be covered by several feet of tailings before the pneumatic tunnel is placed in position, an objection not yet satisfactorily answered.

The Mines Record points out that the question of raising the gold to be saved has been much neglected. Where the claim offers a soft bottom, easily scooped up by a dredge bucket, the gold is cleaned up with ordinary care to a degree of exhaustion to make the employment of other means for the recovery of the gold left in the bottom unprofitable. But the case is entirely different where a hard rock bottom is met with. Where such a bottom carries gold it is almost exclusively contained in crevices of varying depths. In these cases the practice is to keep the buckets going so long as they will bring up any rock, and, when they cease to do so, to declare the bottom cleaned up, though more gold be left behind than was raised by the buckets. There is, of course, no means of knowing what is the quantity of gold that is lost or missed in this manner. The quantity raised, however great, is no index to that left at the bottom, and no steps have been taken to ascertain, however roughly, what the loss really amounts to.

After all, this is only a small item in the waste of gold for which dredging may be held to be answerable. Dredging companies have come to grief because the dredger could not raise the gold that had been proved to be in the rock by previous prospecting. The rock scraper described is designed to cope with the difficulty. The pneumatic tunnel of the rock scraper is intended to deal with boulders. A wire rope, with chain attachment, is provided outside the tunnel, as shown in the accompanying engraving, and marked "Boulder Line." This boulder line is attached by the man at the bottom to the stones to be removed. The line, or two-wire rope, is worked from the deck, drawing the stones back on cleaned-up ground, where they are deposited clear of everything. If the stones are too large to be bodily shifted they can be blasted.



Sound Heard Through Rock.

To the Editor:—In "Concentrates" of Jan. 26, it is said that hammering and drilling have been heard through 180 feet of rock. In the Antioch tunnel, in Breece hill, we have heard a 2-inch air drill in Ibex M. Co.'s workings, 511 feet below us, and about 260 feet north, or 573 feet in a right line. From a winze sunk in a crosscut from the same tunnel, we have heard a 2¾-inch air drill in the Yak M., M. & Tunnel Co.'s tunnel, about 610 feet below us, and about 450 feet west, 758 feet in a right line. Breece hill, above these workings, and for at least 300 or 400 feet below, is composed of hard, close-jointed quartz porphyry. The sound of the drilling, barely audible as one stood in the drift, became quite distinct if the forehead was pressed against the wall rock.

Leadville, Colo. Percy McGeorge.

The cost of a horse power per hour, in different sorts of motors, has been studied by M. Charvet, who asserts that a French laborer working eight hours in turning a crank at a wage of about 70 cents per day produces one horse power hour at a cost of 85 cents. An ox turning a horizontal bar 13 feet long (as in some grinding mills) produces the unit at a cost of 23 cents. A horse doing the same kind of work travels faster than the ox, and the unit of work costs a little less than 20 cents. A 6 H. P. steam engine (working 150 days each year and ten hours per day, as is customary in farm work) produces the unit of work at a cost of about 4 cents. The gas or oil engine is more economical in operation, but its work in France costs about 7 cents on account of customs duties. The windmill produces its unit of work at 2 cents, but M. Charvet concludes that the most economical form of motor is the water wheel. He argues that a water wheel whose first cost is about $160 per horse power produces a unit of work at a cost of less than 1 cent, and that turbine wheels are even more economical.

Two electrical furnaces at McGill University, Montreal, Canada, have a capacity of 110 volts, and are large enough to take a current of 100 amperes. These furnaces, with heat of 3000° to 4000° C., split up compound substances into their component parts, with important results for commercial purposes. They will also be used for the manufacture of diamonds, a process discovered by M. Moissan. The study of the diamond fields of South Africa convinced him that great heat and great pressure have been the agents that turned carbon into the diamond. He therefore fused in the electric furnace carbon and iron at enormous heat, and then cooled the compound off rapidly, thus subjecting the carbon mixed with it to tremendous pressure, resulting in the formation of diamonds, answering all the tests of the natural gem. The artificial product is, owing to size, of no commercial value.

A solar motor is reported in operation at South Pasadena, Cal. The device comprises a funnel-shaped reflector 33½ feet in diameter at the top and 15 feet at the bottom, containing on its surface 1788 mirrors. This reflector is set on two fixed supports in such manner that it may follow the movement of

the sun, and is kept in focus by clockwork. The adjustment of the mirrors is such that the sun's rays are concentrated on a boiler, tubular in form, 13½ feet in length, with a capacity of 100 gallons of water and 8 feet additional for steam space. The concentration of heat is capable of raising the temperature to several thousand degrees, but the boiler is prevented from being superheated by the water within it, which is brought to 350° or 400°. The engine is fed and the supply of water in the boiler is maintained automatically, and the only attention necessary to operate the machine is to adjust the mirror to focus and set in operation in the morning. This motor is stated to be pumping from a large underground tank at the rate of 1400 gallons a minute.

Stamp Mill Foundations.

Written for the MINING AND SCIENTIFIC PRESS by A. W. WARWICK.

No one has had the temerity to criticize Dana Harmon's paper on the "Stamp Milling of Free Gold Ores." Nor is anyone likely to do so, taking the paper as a whole. The personal experience of such a man as Mr. Harmon is of the highest value, but when we get so much good horse sense wrapped up in a frisky literary style we derive pleasure as well as profit. I hardly believe that any millman will dissent from the general tenor of that paper.

All writers on stamp milling (even Mr. Harmon) apparently insist that the mortar blocks must be set on solid rock, the rule seeming to run, "The mill site must be chosen with reference to the foundation; if the most convenient place has no rock bottom it can not be used, but an inconvenient place with rock foundation will be all right." This idea seems to me to be all wrong. I would lay down a general rule to the effect: Build the mill in the most convenient location; if no natural foundation exists, construct one.

The writer saw a small stamp mill being erected about three years ago on a sand bottom, and quite loose sand at that. He also saw the mill running, and a smoother running mill has rarely been seen. The people putting in the mill had none too much funds and the construction had to be cheap. All that was done was to sink the customary battery block pit, which was widened at the bottom until it had an area of 5x8 feet. The sand at the bottom was wetted and rammed. On this bottom cross pieces of old railroad ties were laid (Fig. 1) and all cracks and

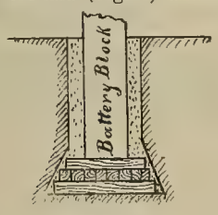


FIG. 1.

spaces filled and rammed with sand. Above this another layer of ties was placed, also rammed with sand, and at right angles to the bottom layer. Another layer of cross packing finished the foundation. The whole was covered with sand as usual and the battery block put in place. After running the mill for several weeks not the slightest trace of subsidence could be detected. This style of foundation is by no means a model one, nor would one recommend it as a permanent job. Still, it did its work during the time it was required, and surely went to show that a rock foundation is not a sine qua non.

About two years ago the writer put up a 10-stamp mill in San Bernardino county, Cal., the conditions requiring the mill to be situated at a point not only where there was no rock bottom, but where there were strata of a drummy, loose conglomerate or hardpan. A point was selected so that when the grading was completed the battery pit went below the conglomerate and a bottom made in the soft, homogeneous sand—thus violating, apparently, all rules given for battery foundation. The pit was widened out at the bottom until it had an area of 5x12 feet, or 60 square feet (Fig. 2). On this bottom was placed (and well rammed) a Portland cement concrete, made by mixing four parts sand, one part Portland cement, two parts broken granite, this foundation being 30 inches thick. The concrete was kept wet for several days and a cap consisting of one part sand and one part Portland cement was given and struck off quite smooth and level, also being kept wet for several days while hardening. In two weeks the foundation was as hard as granite, and when struck gave a clear ring, showing that it was solid and ready to receive the mortar blocks. Before laying the mortar blocks the concrete was covered with a couple of skins of 2-inch plank laid crosswise. To receive the mud sills a series of concrete piers was built, with h. d. bolts going through them. These piers had an area at the bottom of about 3x3 feet, narrowing up to 16x16 inches. The battery blocks and mud sills were placed on this foundation in the usual way, and when the mortars and battery frame were in place, about a month after, not the slightest subsidence was detected after very careful tests. When the mill finally got to work—about seven weeks after the concrete was in place—it ran as smoothly and gave as little trouble as if it were built on a solid granite foundation. For the whole work eleven barrels of Portland cement (Belgian) were used.

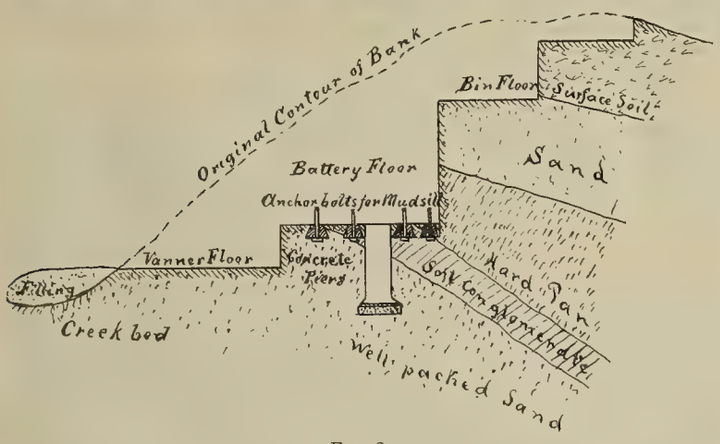


FIG. 2.

In making an artificial battery foundation, observing the following rules will insure success:

1. Let the foundation be deep enough so that the bottom is of a homogeneous character. A foundation partly on rock or partly on gravel will surely fail.
2. When a uniform bottom is obtained, area and not depth is required. Allow 25 square feet for a 5-stamp foundation, or 60 square feet for a 10-stamp mill.
3. Use only the best Portland cement. Remember, a concrete made up of four parts clean, sharp sand, two parts broken granite and one part Portland cement is stronger than concrete made of 6 parts sand and one part cement.
4. The concrete foundation should be not less than 30 inches thick.
5. Finish off with one part sand and one part cement.

Notes on Cheap Gold Milling in Mexico.*

By H. F. COLLINS, Chiapas, Mexico.

The following notes on the cheap milling of a soft, low-grade ore body in the State of Chiapas, Mexico, may be of interest. The ore body in question was worked, not by itself, but incidentally in connection with a large extraction of concentrating ore, and one 10-stamp battery of a 30-stamp mill used for recrushing tailings, and provided with copper plates, was set aside for the treatment of this particular ore, of which (during a period of seventeen months) 10,274 tons, of 2240 pounds each, were handled:

DESCRIPTION.—The ore body consisted of that portion of a mass of decomposed garnet rock of igneous origin, which, near its contact with another igneous mass, composed chiefly of the mineral wollastonite in a nearly pure state, had been permeated by solutions, depositing irregularly, throughout it, quartz, chalcedony, silicate and carbonate of copper, gold and much hydrated oxide of iron. The portion thus impregnated and rendered gold-bearing averaged about 30 feet in width, and assays throughout this width varied from 0.05 ounce up to 0.65 ounce, and in one case even 0.9 ounce, the average being about 0.20 ounce of gold per ton of 2240 pounds. The contact zone was exposed on the top of a narrow neck joining two very steep hills, and ran at right angles to the axis of the ridge, so that at the surface it was only about 40 feet long.

MINING.—The accessible end of the ore body was at the top of a cliff about 100 feet vertically above the end of a branch track from the mill. From this point a short drift was run, about 40 feet below the summit of the ridge, a raise was put up, and a shoot was arranged, so that the stuff could be quarried in open cut, readily loaded into the car running in the drift and, from this car, dumped over the cliff. Since about 90% of the material broken was friable, ferruginous garnet rock, and only 10% was quartz and chalcedony (both of which, though extremely hard, were fortunately much fissured), but little explosive was required, and that mostly in large blasts, made to loosen the mass. The fall from the top to the bottom of the 100-foot cliff effectually broke up most of the large pieces of rock. At the latter point the heap was shoveled into cars and trammed to the mill, a distance of some 350 yards.

MILLING.—The material was tipped over a grizzly, 1.5 inches between bars. The proportion of quartz, etc., which did not pass through was comparatively small, one boy, with occasional help, being able to spall the lumps and shovel them again through the grizzly. Thence it was delivered to the mill bin, which held about twenty-four hours' supply for the battery.

The stamps weighed 750 pounds, and dropped 5 inches 100 times per minute. Shoes and dies were of Sandicroft forged steel. The screens were of copper wire, and at first of twenty-mesh size; but as the difficulty of saving the gold became evident, the ore was crushed more finely, first through thirty-mesh screens and finally through forty-mesh screens. There were no inside plates, though quicksilver was fed into the mortars; and it proved exceedingly difficult to keep in condition the outside plates (silver-plated), both green scum and black spots forming rapidly and persisting obstinately, while there was a strong tendency to "scour." Of the gold shown to exist by assay, the percentage extracted was low—only 30%. Experiments with cyanide, however, showed an enormous cyanide consumption, with an extraction not exceeding 50%, which was not considered encouraging. A large number of panning tests showed that the proportion of coarse gold obtained in the heavy black magnetite sand was small, and that most of the particles were visibly "coated" with hydrated oxide of iron. The bulk of the gold, however, was very fine and "rusty," intimately intermingled with the hydrated oxides of iron, among which, apparently, it had been precipitated. In the testing of samples from some of the richer parts of the deposit, an exceedingly fine brown powder adhered to the bottom of the pan; and although, by reason of its weight, presumed to be gold, manifested none of the characteristics of that metal until heated to low redness, when it acquired a metallic luster. The ignited powder yielded iron to hydrochloric acid in a test tube, and was evidently precipitated gold, intermingled or coated with precipitated oxide of iron. Ground with quicksilver, it refused to amalgamate completely; and, treated with cyanide before heating, it dissolved very slowly. This is clearly another instance of gold coated with oxide of iron, of similar nature to that described in the paper of Messrs. Chatard and Whitehead read at the Washington meeting of the Institute.

COST.—The cost of mining and milling was so low that, in spite of the imperfect extraction, this low-grade ore, yielding an average of only 0.0659 ounce of fine gold, was worked at a profit of nearly 80 cents gold per long ton. The mining, though it involved two and sometimes three handlings, was done for 20.5 cents per ton of 2000 pounds; and the milling, including all current repairs and due proportion of mill salaries, for 17.6 cents (no allowance, however, being made for power, since the whole mill, of which the ten stamps formed part, is drived by water power). The cost of milling would have been lower but for the isolated situation of the camp, freight to which from New York comes to about $40 gold per ton. The total quantity treated and its yield may be recapitulated as follows:

Quantity of ore treated	10,274	tons of 2240 lbs.
Total yield of melted bullion	846.36	ozs.
Average fineness	798.5	ozs.
Total yield of fine gold	677.44	ozs.
Yield of fine gold per ton of 2240 lbs	0.0659	oz.

The following table gives the detailed cost in Mexican silver of treatment per ton of 2240 pounds and cost per short ton of 2000 pounds in United States currency, with exchange at 48 cents to the dollar (about its average during the past two years) being added for comparison:

	Mex. silver, ton of 2240 lbs.	U. S. currency, ton of 2000 lbs.
MINING.		
Cost of breaking and tramming—		
Labor	$0.4457	$0.1909
Explosives	0.0337	0.0145
Total cost	$0.4794	$0.2054
MILLING.		
Labor—		
White, foremen, etc	$0.1128	$0.0483
Native	0.0967	0.0415
Materials—		
Shoes and dies	0.0801	0.0343
Screens	0.0148	0.0063
Stems, liners, feeders, etc	0.0371	0.0159
Belts and driving gear	0.0044	0.0019
Quicksilver	0.0141	0.0061
Oil, grease and lighting	0.0343	0.0147
Sundry tools and materials	0.0175	0.0074
Total cost	$0.4118	$0.1764
Total cost mining and milling	$0.8912	$0.3818

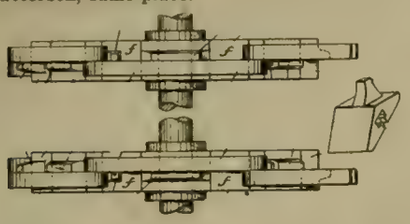
*Trans. Am. Inst. M. E., Richmond Meeting, Feb., 1901.

Mining and Metallurgical Patents.

Patents Issued February 5, 1901.

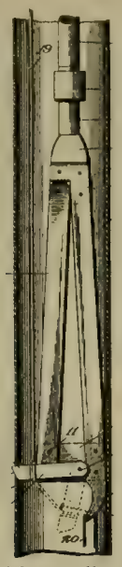
Specially Prepared for the MINING AND SCIENTIFIC PRESS.

CHAIN CONVEYOR.—No. 667,174; A. M. Acklin and W. J. Patterson, Pittsburg, Pa., assignors to Heyl & Patterson, same place.



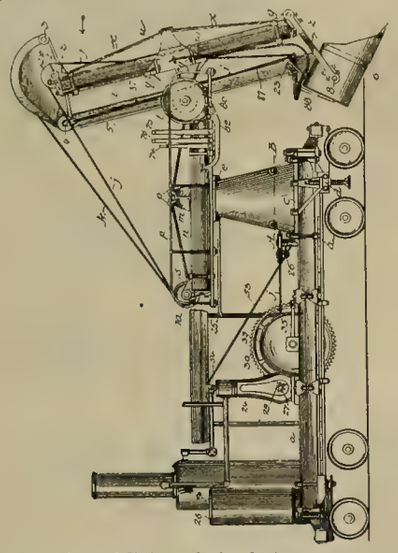
Combination with endless chain having overlapping links, of polygonal drivewheel therefor, peripheral blocks bolted thereto provided with lugs located at angles of wheel alternately at opposite sides of plane perpendicular to wheel axis to engage rear ends of chain links.

WELL CASING PERFORATOR.—No. 667,180; E. J. Bates, Bakersfield, Cal.



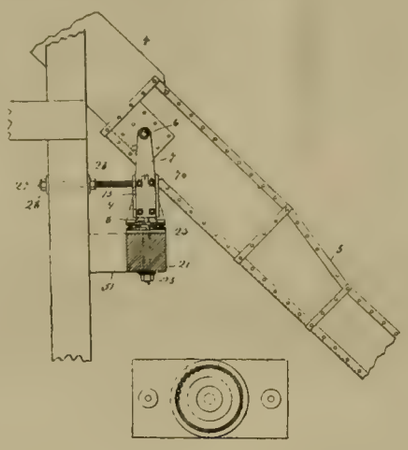
Head provided with coupling for attachment of stem with longitudinally inclined stationary leg, curved extension constituting rest and runner, movable leg pivoted at upper end within head, pair of cutter-supporting plates detachably connected to lower ends of legs, mounted between plates, cutter-operating cable connected to cutter, and fragile binder for connecting cutter during advance of tool through well casing.

EXCAVATOR.—No. 667,314; O. Hetlesaeter, Chicago, Ill.



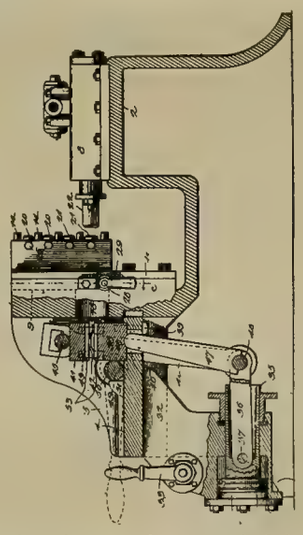
Combination of linkwork bucket arm comprising pair of longitudinal members, one pivotally supported, connections at one end to excavator bucket, at other traverse link; hoisting cable connected with traverse link, exerting power in line other than that of line through pivots of link; retracting cable attached to second longitudinal member; guide for retracting cable located on longitudinal member at point thereon lying upon same side of pivotal point of support thereof, as lies traverse link; pivoted crane box for reception of flanges, horizontal shaft 16 hung for supporting member; turret for supporting crane; means for adjusting crane upon the turret in direction of length of crane; horizontally extending part fixed relatively to crane, having near its periphery means for guiding cables so they shall be trained respectively to opposite sides of axis of crane, driving mechanism for operating cables.

ADJUSTABLE COAL OR ORE SPOUT.—No. 667,335; J. L. Record, Minneapolis, Minn.



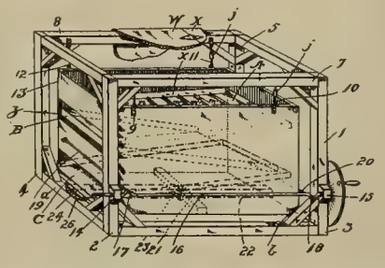
Discharge apparatus for coal and ore bins, combination with stationary chute, of spout having upper end arranged to partially surround mouth of chute and receive discharge therefrom, bolster arranged beneath chute for supporting receiving end of spout, standards on bolster to which spout is pivotally connected to allow free end to be raised and lowered, base on which bolster is mounted, spindle connecting them permitting horizontal rotation of bolster and spout, means for raising and lowering outer end of spout elevated to substantially vertical position when not in use.

MACHINE FOR SHARPENING OR SHAPING DRILLS.—No. 667,187; A. Carstens, Leadville, Colo.



Combination of power hammer, bed having feed opening in line with head of hammer, die block having opening in line with feed opening and hammer head, die formed at outer end of opening, dolly holder, dolly therein, between die and hammer head, means to feed work forward to dolly, rearward to die.

ORE CONCENTRATOR AND SEPARATOR.—No. 667,514; G. J. Frey, Oakland, Cal.

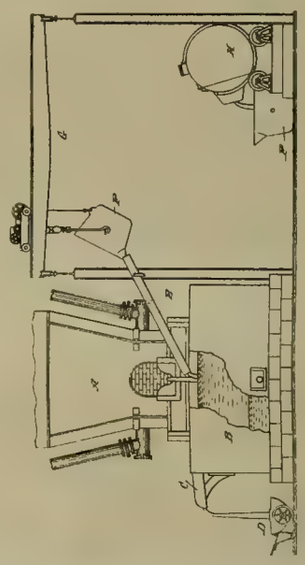


Combination with suitable closed box, interior box 13 within box, adjustable rods 9, 10, 11, 12 attached to closed box suspending corners of interior box, plurality of inclined pans within interior arranged one above the other, upper end of each pan extending beyond lower end of one immediately above, provided with longitudinal flanges, inclined grooves in interior on closed box, pitman rods 19 and 20 connecting opposite ends of interior box to shaft, loosely-fitting bolt 23 connecting bottom of interior box with exterior box, arc-shaped corrugated pieces 24 and 26 secured to opposite ends of interior box and outer box respectively, series of partitions within pans, corrugated pieces made up of series of independent adjacent strips.

ORE CONVEYOR. — No. 667,192; W. R. Craig, Shelby, Ala.

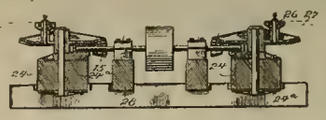
The combination with series of consecutively arranged buckets, bottom of each bucket having forward end formed into hook, rear end provided with heel, edge of heel formed into cylindrical sleeve, each side of bucket bent at right angles to bottom, perforated to register with bore of cylinder, strengthening strip secured to each side piece, each end perforated, intermediate portion provided with offset, axle through each, end provided with roller, track for roller.

METHOD OF TREATING CONVERTER SLAG PRODUCED IN BESSEMERIZING COPPER MATTES.—No. 667,367 G. Mitchell, Jerome, Ariz.



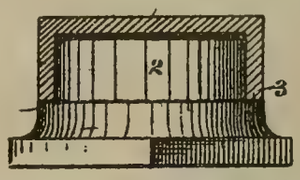
In smelting copper ore in cupola furnace, continuously drawing off slag and matte produced into forehearth of furnace, allowing matte to settle in forehearth, removing portions of it from time to time, bessemerizing portion so removed, pouring the converter slag resulting from the bessemerizing into molten matte and slags as they come from cupola, so that matte and slag of cupola and converter slag will flow into forehearth at substantially same spot, thereby raising temperature of converter slag without use of additional fuel, to point where matte prills contained in converter slag are liberated and settle to bottom of forehearth.

OIL WELL PUMPING POWER.—No. 667,368; W. H. Norton, Scio, N. Y.



Pair of sills, blocks located at top and bottom, shaft power wheel supported by blocks, second shaft supported at right angles to power wheel shaft, bearing formed on upper block in which bearing inner end of said shaft is journaled.

STAMP DIE.—No. 667,415; F. White, Nevada City, Cal.



The object of this invention is to provide a cup or cover of hard metal which is fitted over the dies of stamp mills and receives the blows and wear of the stamp and the ore, so that the die itself will not be worn away; but after the caps have been so worn as to be useless, they can be removed and new ones fitted on, thus saving the lower part of the die.

MINING SUMMARY.

Specially compiled and reported for the MINING AND SCIENTIFIC PRESS.

ALASKA.

The Alaska Industrial Co., Supt. Scott, is pushing work on its properties at Copper mountain, in the interior of the main Prince of Wales island and on Dall island.

ARIZONA.

COCHISE COUNTY.

Native copper is reported opened up in No. 3 crosscut in the Black Diamond, near Tombstone, at a depth of 470 feet.

GILA COUNTY.

The new furnace of the Old Dominion, at Globe, is running successfully.——The Troy Copper Co. is pushing work on the Troy group, near Troy; the shaft, now down over 275 feet, will go to the 300-foot level. Crosscutting will be started at this depth.——A body of sulphide ore 10 feet wide is opened at a depth of 125 feet in the Climax No. 3. Ore is said to run 6% copper.——The new 22 H. P. gasoline hoist, shafting, pipe, water tanks, mine car, rails, etc., are going in at the Black Copper, near Globe; ten men are employed at present and thirty more will be put on soon.

GRAHAM COUNTY.

A strike of good ore is reported made on the Comstock, in Bonanza gulch, 5 miles from Morenci.

MOHAVE COUNTY.

Machinery will go in on the De la Fountaine, at Stockton Hill.——The Jack Little mines, at Campbell, are bonded to Eastern men.——The Schylkill Co. will put in a 100-ton concentrating plant on its property at Chloride; Supt. Thies.——At the Golden Gem and C. O. D. mines, near Kingman, the furnaces are being converted into oil burners, and at the Tub and Prince George mines oil burning engines will go in.——An electric plant will go in on the Maguire ranch, south of Kingman, to supply power to the Gold Road mines, near there.

PINAL COUNTY.

The Belle, Columbia and Martinez mines, 18 miles northwest of Florence, are reported sold to a Santa Barbara, Cal., company for $40,000.

YAVAPAI COUNTY.

The White Horse M. Co. is ready to begin on its group on Lynx creek, near Prescott.——At Huron, the Henrietta M. Co. is working eighteen men, and the mill is running steadily on ore from the Silverton.——At the McCabe, thirty men are working.——Operations at the Swindler, near Prescott, owned by G. W. Hull, are under way; Supt. J. W. Hubbard.

The tunnel on the Verde Chief, in Black canyon, near Jerome, now in 200 feet, will be run an additional 200 feet.——A new $5000 hoist will go in on the Pride of Arizona, at Big Bug; an 80 H. P. boiler was recently put in.——A steam hoist and pumps are about placed at the Mammoth.——A new shaft-house is going in on the Kicker of the Amalgamated G. & C. Co.——The Farley-Kay properties are reported sold to St. Joseph, Mo , men, and 5000 feet of tunnel will be run.——New machinery, including a 55 H. P. gasoline engine, air compressor and drills, is going in on the Gunther group, near Gilbert; No. 1 shaft is down 300 feet, and drifting is in progress on the 200-foot level. A whim is put in on No. 2 shaft.——The Great Belcher, at Big Bug, now down 500 feet, will go to the 700-foot level.——The shaft on the Golden Fleece, on Lynx creek, now down 200 feet, will be sunk an additional 100 feet.——Aikenite, a sulphide of copper, lead and bismuth, was recently found near Prescott.

YUMA COUNTY.

C. Eichelberger is pushing work on his property near Tyson's Well, two shafts are down 200 feet and 90 feet respectively.——Seven tons of ore recently shipped from the Modesti, 2 miles from Kofa, returned $108 per ton. Shaft is down 100 feet; vein at that depth runs 6 feet in width; Supt. J. Young.——The dredger of the Advance G. Dredging Co., at the Pot Holes, is running day and night; Supt. H. Linn.——During 1900 the output of the La Fortuna mines, 28 miles southwest of Yuma, owned by C. D. Lane, was $1,368,000 gold.

CALIFORNIA.

BUTTE COUNTY.

The Bloomer M. Co. is pushing work on the Bloomer, at Berry creek; a 200-foot tunnel has opened up quartz ore.

CALAVERAS COUNTY.

The Bennet-Sickle, at Angels, is reported sold to the Utica M. Co. for $15,000; same company has bought the Dead Horse (quartz) mine and millsite.——On account of a scarcity of wood, the Ghost is closed down; the Lightner chlorination plant is also closed down for some reason.——A new jacket pump is going in at the Gold Hill; 163 feet of water in shaft.——The Anglo Saxon G. M. & T. Co., of Boston, Mass., is opening up the old Ilex property, at Mokelumne Hill; Supt. J. O. Stewart.——A contract is let by the Glencoe M. & M. Co. to run a 100-foot tunnel on the Rockingham, near Glencoe; it will tap main shaft, now down 170 feet, at a depth of 120 feet.——New machinery will go in at the Lockwood, near Mokelumne Hill; operations at the mine are closed; owing to bad roads mill is being removed to site nearer mine.——The Machu and Smuggler mines, at Mokelumne Hill, are bonded to J. E. Spencer.——Rich ore is opened up on 200-foot level of the Lone Star.

EL DORADO COUNTY.

Unwatering the Church, at Placerville, is progressing.

INYO COUNTY.

More men are being put on at the Defiance, at Darwin.——Ore assaying $400 to the ton is reported in a 2-foot ledge in Yuba canyon, near Independence.

J. King, owning and operating the Bronco mine at Ballarat, will put in a mill in October.——A ledge of $35 ore is reported in the O Be Joyful, in Tuba canyon, near Ballarat. A one-third interest in the group is reported sold to W. S. James of Los Angeles for $16,000—$8000 cash and the balance in ninety days.

LOS ANGELES COUNTY.

At Newhall the Santa Ana Oil Co. recently struck oil sand at a depth of 850 feet. The well is said to be producing 200 barrels of oil per day.——The Zenith Oil Co.'s well, down 800 feet, is expected to strike oil at 900 feet.——The Alpine Oil Co. is drilling its No. 3 well. No. 2 is producing steadily.——The Sunset Park Oil Co. has struck oil sand at a depth of 520 feet on its property on Sixth street, Sunset Park, Los Angeles.

MARIPOSA COUNTY.

Ten stamps are dropping at the Francis, near Indian Gulch; mill is run by water power obtained from Mariposa creek.——The Mariposa Co. has closed down the Pine Tree mine, near Bear valley, and the Josephine.

MONO COUNTY.

Work is in progress on the old Harrison Berry, east of Topaz; A. M. Livingston of Oakland, owner.——Carney & Frost are operating the Pin Hook, near Antelope.——Good float rock is reported found on the Lake, same locality.

NEVADA COUNTY.

Operations are resumed at the Midnight, on Deer creek, near Nevada City.

The shaft at the Diamond, Grass Valley, is down 180 feet; a new ore chute is opened up on the 150-foot level; sinking will be resumed.

ORANGE COUNTY.

The well of the Rincon Crude Oil Co., in the Fullerton district, is down over 1000 feet; drilling is in progress.

PLACER COUNTY.

The Eureka Con. M. Co. at Forest Hill has struck the blue gravel in the face of the drift at a vertical depth of 750 feet, and 4230 feet from the mouth of the tunnel, thus verifying and vindicating the effort and judgment of the superintendent in pushing the drift for the last four years. To drift mining in that vicinity the striking of the blue gravel means much, maybe another Mayflower.

SACRAMENTO COUNTY.

The Blue Ravine M. Co. has a machine for grinding black sand and sulphurets collected from sluice boxes in place. Heretofore sand and sulphurets have been shipped away for treatment.

SAN BERNARDINO COUNTY.

At Gold Mountain the 40-stamp mill, owned by J. R. DeLamar, is running steadily; sixty additional stamps will probably be added this year; seventy-five men are employed.

D. E. Hayes of San Francisco will buy 380 acres of mineral land north of Ontario for $50,000. The contract calls for the expenditure of $2000 during the first three months and of $5000 for each of the three remaining quarters of the year.

SAN DIEGO COUNTY.

Ore from the Iron Mountain, near Warner's Springs, recently crushed at the Ready Relief mill at Banner, ran $40 to the ton.

The Golden Cross, near Ogilby, owned by the Free G. M. & M. Co., comprises thirty-two acres; surface shafts are down from 700 to 1000 feet; two mills on the property have a total of 140 stamps; the 300-ton cyanide plant is said to treat tailings at a cost of 70 cents per ton; ore runs from $4 to $10 per ton.——The shaft on the American Girl, near the Golden Cross, is down 450 feet; ore runs about $12.50 to the ton; crushers are going in; latter will treat ores from the American Girl and from the American Boy, adjoining; ore from latter mine runs about $15 to the ton; American Boy shaft is down 350 feet.

SHASTA COUNTY.

Work on the Bunker Hill, near Redding, will be resumed shortly.

A half interest in the Alice and other claims in Sunny Hill district is sold to T. A. & H. T. Finnell for $1500.

An air compressor will go in at the Shasta King, near Kennet; general manager, L. Auerbach.

Sinking and drifting are in progress on the Hart, in Old Diggings district, near Shasta. Thirty men are employed. The shaft is down 1100 feet. The ore is said to run from $10 to $500 to the ton.——Work is progressing satisfactorily on the Wiser, Sally Ann and others at Lower Springs.——It is thought that as soon as litigation over the Mt. Shasta is settled a mill will go in.——A company is incorporated to work the cinnabar mines on Clover creek.——A tunnel is being run on the Baker's at Old Diggings to tap the ledge at a depth of 300 feet.——Sinking is in progress on the Evening Star.

The Atlantic Oil Co. of Shasta county, capital $500,000, is organized at Redding to work 1920 acres of oil lands near Millville.

The Clover Creek Cinnabar M. Co. has incorporated at Redding, with 300,000 shares at $1 per share. The property is on Clover creek, east of Millville.——The Trinity Copper Co. has surveyors in the field, with headquarters at Kennet.

SIERRA COUNTY.

Supt. L. Cortez of the Sailor Boy, at Brandy City, is pushing work.

SISKIYOU COUNTY.

At Sawyer's Bar, Kleaver & Co. will start their mill.——Operations at the mine and mill of the Yreka M. & M. Co., at Sawyer's Bar, are progressing.

Supt. Fitch has extended the flume of the Salmon River M. Co. to a point one-half mile below Sawyer's Bar; work on the Myers (drift) is in progress.

SONOMA COUNTY.

A company is organized at Petaluma to bore for oil near there.

TRINITY COUNTY.

The Parker Bar Placer M. Co., operating at Lowden Ranch, has about 1000 acres of ground.——The Galvin Dredging Co., operating near Weaverville, has 321 acres of ground.

COLORADO.

ARCHULETA COUNTY.

The Omaha M. Co. will begin work on its group of claims near Pagosa Springs early in the spring; a 3000-foot tunnel will be run, which will gain a depth of about 2700 feet.

BOULDER COUNTY.

An 8-foot vein of ore is reported opened up on the 200-foot level of the Fourth of July, at Eldora.——Drifting is in progress on the Golden Eagle, at Ward.

CHAFFEE COUNTY.

A car of ore recently shipped from the Belle of Granite, at Granite, yielded $3500.

CLEAR CREEK COUNTY.

Operations are resumed on the Josephine, at the foot of Kelso mountain, near Georgetown.

The Silver Age group, near Idaho Springs, is reported sold to the Colorado-California S. M. & M. Co.; a new shaft will be sunk; ore runs from $40 to $50 to the ton.

DOLORES COUNTY.

At Denton, connection is made between No. 4 level of the Emma and the crosscut on the Scott.

GUNNISON COUNTY.

At Gold Brick, the tunnel on the New Bassick & Belzora Nos. 1 and 2 (consolidated), on Sacramento mountain, is in 70 feet; shaft is down 40 feet.——The Brunswick M. & M. Co. is driving a new tunnel on the Jimmy Mack group of seven claims on West Gold hill.

LAKE COUNTY.

The shaft on the Coronado, at Leadville, is down 660 feet; new ore bodies opened up at that depth have added 100 tons of ore per day to shipments of the district; Manager Higgins.——During December, 1900, 1200 tons of ore were taken out of the Maid of Erin (silver), at Leadville, owned by the A. M. W. Co.——The Fryer Hill G. M. Co., operating the Double Decker and Fairplay claims, on Yankee hill, Leadville, expects to cut the old producing ore shoot soon, drift now being in 40 feet.——A pump is put in on the first level at the Valentine, and 300 gallons of water per minute are being handled; Manager C. Bohn.

OURAY COUNTY.

A new 1200-foot tramway is to go in at the Bachelor, at Ouray.

Ore carrying 300 ounces silver, with copper and gold, is reported at the Governor, at Ouray.

PARK COUNTY.

A strike of copper and gold ore is reported made near Midland Station; shaft is down 100 feet, opening up a 4-foot ledge of ore running $180 in gold, copper and silver to the ton; it is thought that regular shipments of ore will be begun soon.——The Boomer, same locality, is shipping regularly

SAGUACHE COUNTY.

At Crestone, a new shaft will be sunk on the Cleveland.

J. R. Robinson and other Colorado Springs men have bought a group of claims at Bonanza, ore from which is said to run $40 to the ton.

SAN JUAN COUNTY.

The auxiliary steam power plant at the Kendrick-Gelder smelter at Silverton is in place.

The Red Mountain M. Co. will soon begin work on the Lead Carbonate group, above Gladstone; about 400 feet of work is completed on the property and ore is said to run $12 gold to the ton; a crosscut tunnel will be run to cut the veins at a depth of from 600 to 1000 feet.

SAN MIGUEL COUNTY.

The Alta M. Co. contemplates putting in a mill on the Alta, near Telluride, this season; ore reserves in this mine are estimated at $600,000.

During January 157 carloads of ore were shipped from Telluride.——The tunnel on the St. Julien, which crosses the Palmyra, is in 1000 feet.——The Rose group, consisting of five claims on Last Dollar mountain, near Telluride, is reported sold to G. B. Cook of St. Louis and F. Howard of Kansas City; a mill will be put in.

The Lake View group, in Ophir district, has about 1800 feet of tunnels, etc.; it is said that cost of extraction does not exceed 25 cents per ton; lowest levels are 4000 feet below the apex of Yellow mountain.

SUMMIT COUNTY.

At Kokomo, work is resumed on the Michigan.——The Col. Sellers is shipping ore.——A long tunnel will be driven into Gold hill by the Union Con. Co.——At Frisco, operations are under way in four levels of the Excelsior.

TELLER COUNTY.

Supt. Trevarthen furnishes the following figures showing the production of the Portland mine for the year 1900:

	Net tons.	Ounces gold.	Ounces silver.	Gross value	Treatment charges.	Freight charges.	Net proceeds.
				$	$	$	$
January...	3,811.668	9,102.539	652.915	178,329 25	28,052 32	9,636 32	140,640 57
February...	3,678.836	11,400.887	840.414	223,844 30	28,400 60	11,846 67	183,597 03
March.....	4,380.408	10,446.559	196.216	205,680 80	33,519 72	13,088 65	159,072 43
April.....	1,934.808	3,191.342	.....	63,734 61	14,530 35	4,822 08	44,382 18
May.....	4,210.406	7,856.660	.....	157,133 20	30,127 60	11,529 96	115,475 64
June.....	5,864.571	9,884.380	28.658	197,726 66	41,273 61	14,800 99	141,652 06
July.....	5,088.870	9,023.754	274.245	180,631 40	35,883 86	12,768 27	131,979 27
August.....	6,326.353	10,216.894	88.080	204,388 07	43,944 49	15,185 04	145,258 54
September...	5,780.611	9,247.669	289.388	185,128 91	41,243 43	14,762 14	129,123 24
October....	5,987.594	11,498.664	1,024.329	230,600 97	44,853 24	15,094 08	170,653 65
November...	6,583.898	12,002.818	816.390	241,555 65	48,397 42	16,510 10	176,637 13
December...	7,138.732	14,140.667	857.561	282,616 44	50,812 38	19,054 64	212,749 42
Totals...	60,786.755	118,062.833	5,078.195	$2,351,369 26	$841,039 16	$150,098 94	$1,751,231 16

During the four months ending Jan. 15 last the thirteen leasers on the Anaconda at Cripple Creek have produced 2551.313 tons of ore, valued at $62,578.54, upon which a royalty of $7931.32 was paid.——

The Pythias G. M. Co. will sink a working shaft 500 feet on the Last Chance, on Bull hill, Cripple Creek. A plant capable of sinking 500 feet will be put in; F. Smith Supt.——Ore running 30% lead, $50 in silver and eight ounces gold per ton is reported from the Highland Chief, on Galena hill, Cripple Creek.——Giles and associates have finished putting in a new steam plant on the north block of the Sedan. Drifting and crosscutting will be done on the 100-foot level.——Sinking is in progress on the Kellum lease, on the Sedan.——An extra shift is put on at the Ophelia tunnel Two machine drills are used.——The Camilla Leasing Co, operating the Maud Helena, will put an extra shift on sinking the shaft, now down 180 feet.——The Eagle sampler at Cripple Creek is treating 200 tons of ore daily.——The Pittsburg Bankers' Leasing Co. will resume on the Morning Star. It is said that $70,000 has been spent in development on this lease.——A body of good ore is reported opened up in the winze on the Alsa R., Cripple Creek.——The Theresa M. & L. Co., operating a block on the Theresa, on Bull hill, is running its sixth level.——The shaft on the Extra is down 150 feet and the ore runs $35 per ton.——On the Santa Rita the shaft is down 600 feet.——The shaft on the Wild Horse, now down 500 feet, will be sunk to the 800-foot level. At that depth connection will be made with the Columbine-Victor tunnel, which is expected to be finished by June.——The Elkton at Cripple Creek is said to produce $125,000 per month.——Berg & Co., operating on block 2 of the Deadwood at Victor, have sunk a 500-foot winze from the 552-foot level. The ore at this depth runs from $16 to $60 to the ton. The shaft is down 652 feet. A 100-foot crosscut will be run on this level.——On the 220-foot level of the Rigi at Victor a 70-foot west drift and a 30-foot east drift are run.

The Metallic tunnel, now being driven through Rhyolite hill, Cripple Creek, will also pass through a portion of Copper mountain, Carbonate, Tenderfoot and Globe hills, and into Gold hill, cutting them at depths of from 1000 to 1500 feet.

IDAHO.

ADA COUNTY.

The Buffalo Hump G. M. Co., capital $1,000,000, is incorporated at Boise City.

The Thunder Mountain Copper Co., capital $120,000, is incorporated at Boise.

BLAINE COUNTY.

The mill at the Star, near Hailey, will start up soon. The ore opened up in the 172-foot crosscut on the 300-foot level runs from 6% to 20% copper, from ten to forty ounces silver and from $10 to $150 gold to the ton; H. H. Hollister owner.——Ore running from 6% to 30% copper and $60 gold to the ton is opened up in the 500-foot level of the Tip Top; Supt. Lusk.——A new 20-stamp mill will go in for the Hattie at Hailey this year; J. Black owner; 1050-pound stamps will be used in the mill. —— A heavier compressor is going in at the Crœsus, to enable sinking to be continued.——Messrs. McClure of St. Louis, Mo., will sink a 1000-foot shaft on the Black Cinder group; Supt. J. Doniphan.——A 10-stamp mill will go in on the Jumbo, near Hailey.——A 1200-foot tunnel is being run on the Red Elephant, near Hailey, owned by A. Brown of Salt Lake, Utah.

CUSTER COUNTY.

The Yankee Fork, on Estes mountain, near Custer, is sold to Boston men for $100,000.

The Lucky Boy, near Custer, has forty men working; a cyanide annex is in at the mill, and it is said to save 98% of the value. The cost of milling is given as $2.50 per ton.——Ore from the vein on the Admiral Dewey assays from $4.40 to $262 per ton.

LEMHI COUNTY.

A ledge of rich ore is struck on the A. D. & M., at Gibbonsville; more men will probably be put on.——Operations on the Clara Morris and Hughes & Hunt mines, near Gibbonsville, are resumed; ten men are working.

OWYHEE COUNTY.

The buildings at the Blaine tunnel, near Silver City, were recently destroyed by fire, and will be rebuilt.

SHOSHONE COUNTY.

A carload (26,082 pounds) of ore recently shipped from the Snowstorm, near Mullan, netted $277.25—an average of $21.26 per ton.——McIntosh, Crawford & Hyde of Kellogg, operating the Sherman group, on Elk creek, near there, will erect a concentrating plant there this spring; they have bought the timber and machinery of the old Elk creek mill and will use the same in the new plant.——The Idaho-Montana Summit M. Co., Ltd., capital $100,000, is incorporated at Murray.

Two feet of high-grade ore are opened up at the 100-foot mark in the upper tunnel of the Humming Bird at Burke. The lower tunnel is in 120 feet.——An air shaft from the tunnel level to the surface is just completed at the May, on Pine creek, near Wardner; Supt. T. Brown.——Sixty men will be put on at the Hunter at Mullan. Operations will be resumed.——The new ore bins at the Mammoth, near Wallace, will probably be completed within a month. The building is 30x60 feet and the bins are calculated to hold thirty carloads, or about 1500 tons, each.

MONTANA.

BEAVERHEAD COUNTY.

A new lease is secured on the Polaris, near Dillon, by J. E. Rickards and others of Dillon, for $25,000; ore is being shipped from the property.

LEWIS AND CLARKE COUNTY.

The furnace capacity at the East Helena smelter is now 1000 tons per day; apparatus going in to catch flue dust.

MADISON COUNTY.

Work at the Red Cliff, near Red Bluff, is suspended until the concentrator is in operation.——The new battery of boilers is in at the Red Bluff and pumping is now in progress; machine drills will be used at the mine when latter is unwatered, and more men will be put on; Manager Turner.——The Centennial-Toledo G., S., L. & C. M., M. & S. Co. will sink 100 feet on the Toledo, near Sheridan.

Work is under way on the Emma B., on Mill creek, near Sheridan; a cyanide plant is on the property.——The new 20-stamp mill on the Lake Shore, same locality, will operate this spring; twenty men are working. —— The Montana, near the Lake Shore, is closed down for the winter.——The Klondyke, at Sheridan, is leased to W. B. Holmes of that place.

SILVER BOW COUNTY.

At Butte the new compressor and drills are in at the Lake Shore, and progress is being made in driving the tunnel.——The Milwaukee & Montana M. Co., operating the Chile, will put in a concentrating plant this spring. ——Shipments of ore from the Elkhorn Queen average about 500 tons per month.

NEVADA.

ELKO COUNTY.

At the Copper Mountain group, near Tecoma, it is estimated that there are over 100,000 tons of high-grade copper ore blocked out; property is owned by Lewisohn Bros of New York; D. Kane, Supt.

Mr. Bacon has ten men working his coal property southeast of Elko.

LYON COUNTY.

The Boston-Montana Copper Co. of Butte, Mont., will put in a 150-ton smelter at Wabuska during the year.

STOREY COUNTY.

The 10-stamp mill of the Comstock Tunnel Co., at Sutro, has begun crushing rock from the waste dumps at the mouth of the Sutro Tunnel.

Transformers are going in on the 1750-foot level of the Con. California & Virginia, at Virginia; during week ending Feb. 9th six cars of ore (340,450 pounds R. R. weight) were shipped to the Selby Smelting & Lead Works, San Francisco, Cal.; average assay value of ore shipped was $54.74.——The west drift in the Ophir is in 226 feet; 125,100 pounds of ore and one bar of bullion of par value of $1764.22, the result of a mill test of 100 tons of second class ore at the Douglass mill, were shipped to the Selby Smelting & Lead Works, San Francisco, during the week ending Feb. 9th; the west drift on the 56-foot level is in 307 feet ——On the Central tunnel level of the Mexican the west crosscut is run 296 feet; face in hard porphyry.——The tunnel on the Hale & Norcross is in 2017 feet.——On the 220-foot level of the Sierra Nevada the south drift from the northwest drift, 387 feet from shaft, is in 144 feet; west drift on the 1600-foot level is cleaned out and repaired for a distance of 990 feet from shaft.——At the Chollar, No. 1 east crosscut on surface tunnel level, started 455 feet north of the tunnel, is out 35 feet; face composed of clay and porphyry.——On surface tunnel level of the Potosi the south drift from the main tunnel, 40 feet east from end of drift and 972 feet in from its mouth, is run 323 feet.——At the Silver Hill the southwest drift is in 190 feet; raise started in the Holman tunnel, 110 feet above track floor, is run 33 feet.——At the Gould & Curry stoping is in progress on the first, second, third, fourth and fifth floors of the 325-foot level; during week ending Feb. 9th 214 tons of ore were milled; which returned $11.28 coin per ton, as per battery samples.——The west drift on the 425-foot level of Best & Belcher is in 73 feet.——Surface tunnel No. 2 in the Utah is in 863 feet; face in hard porphyry.——At the Belcher repairs are being made to the main lateral drift on the 1100-foot level.——A crosscut is being run on the 1100-foot level of the Crown Point.

WHITE PINE COUNTY.

The new $35,000 cyanide plant of the Ely M. Co., at Ely, is running.

A new body of high-grade ore is uncovered at the Rocco-Homestake, at Hamilton; Supt. H. A. Jackson; vein is 1 foot in width.

NEW MEXICO.

DONA ANA COUNTY.

A strike of rich ore is reported on the 200-foot level of the Torpedo, at Organ.

GRANT COUNTY.

A strike of sulphides was made recently on property of the Clifton Copper Co. near Earnst; $30,000 worth of the ore is estimated in sight.

At Pinos Altos the concentrator is completed.——Work is resumed on the Texas, at Central.

LINCOLN COUNTY.

The new dredger of the American Placer Co., at Jicarilla, is completed and will start this month.

SANTA FE COUNTY.

The Golden Eagle, at Cerillos, is sold to the smelter at that point.

SIERRA COUNTY.

A one-half interest in the Ashville, near Grafton, is sold to A. Walker for $15,000—$1500 cash, balance in ninety days.

At Chloride drifting is in progress on the May; ore carries copper and silver.

SOCORRO COUNTY.

It is feared that the recent order of the Secretary of the Interior regarding the Gila Forest Reserve may result in closing down several mines in the Cooney district, among them being the Cooney (copper), the Maud S., the Helen group, the Last Chance and others. The Cooney is operated by H. C. McCreery of Colorado Springs, Colo.; a concentrating plant is on the property and regular shipments of ore are made to the Silver City, Colo, smelter.——The Maud S. is credited with a production of 65,000 tons of ore, valued at $850,000; 11,000 tons of ore are estimated in sight; a good plant is on the property. —— The shaft on the Last Chance, operated by the Last Chance M. Co. of London, England, is down 600 feet; a 20-stamp mill is in operation.

A body of gold-copper ore is opened up at a depth of 350 feet in the Hardscrabble, at Magdalena; find is said to be from 30 to 40 feet wide.

TAOS COUNTY.

Work is under way on the Sedgwick, at Amizett. —— Machinery for the 25-ton stamp mill for the Black Copper is on the ground and construction work will be pushed.

OREGON.

BAKER COUNTY.

The new 10-stamp mill at the Gold Mill, 20 miles south of Baker City, is in operation; it is probable it will be enlarged this spring or summer; J. A. Panting, manager.

The Golconda, in Cracker Creek district, near Baker City, is reported sold for $600,000; a 20-stamp mill and a hoisting plant are on the property.——The shaft on the Gold Hill, at Express, is down 850 feet.——Ore from the Justice, at Sumpter, operated by the Justice G. M. Co., runs from $18 to $63 to the ton; the ledge is 12 feet wide.——Good progress is being made in running the tunnel on the Tammany, near Sumpter.

JOSEPHINE COUNTY.

The Sugar Pine, in Galice Creek district, near Galice, is reported bonded to H. W. Kerchoff and E. W. Rattler.

TEXAS.

BURNET COUNTY.

The White Eagle M. Co., recently incorporated, will put in a mill on the White Eagle (copper), near Burnet; ore carries gold.

UTAH.

BEAVER COUNTY.

Ore running 24% copper to the ton is being taken out at the Ben Harrison, at Milford; shaft is down 60 feet and a drift is run at that depth.——D. W. Dederichs, Supt. Talisman group, in Star district, 5 miles from Milford, reports good progress on that property.

BOX ELDER COUNTY.

The Century, in Park valley, 25 miles northwest of Kelton, is turning out ore running $25 to the ton; a 50-ton per day mill, costing $10,000, will go in this spring.

JUAB COUNTY.

At Tintic the King William is sold to the Grand Central for $180,000.——The Mammoth No. 2, a fractional claim 200x400 feet, lying between the Mammoth and the Ajax mines, is reported sold to S. McIntyre, W. McIntyre and E. Richards for $25,000.——The same ore chute that was recently opened up on the 1800-foot level of the Mammoth is reported opened up in the 100-foot drift on the 1900-foot level.——A car of ore from the Lower Mammoth at Tintic, recently shipped, netted $3400 ——The Elma M. Co. will begin work on the Elma, at Tintic.

The new ore body recently opened up on the 600-foot level of the May Day, at Tintic, continues to be of same grade, ore yielding eighty ounces silver to the ton.——A concentrator, with a capacity of from 125 to 150 tons per day, and to cost $20,000, will go in at the Tesora, at Tintic, this spring; Manager, O. P. Posey.——An assessment of 1 cent per share is levied by the Little Chief M. Co. of Eureka, delinquent March 15th.

During January thirty-five cars of copper and gold ore were shipped from the Carissa, at Tintic.

PIUTE COUNTY.

A strike of $30 ore is reported made in the 225-foot tunnel of the Wheeler group, at Fish creek; the vein is 16 feet wide; owner, G. W. Wheeler of Minneapolis, Minn.

SALT LAKE COUNTY.

The new eight-drill compressor, recently put in at the Bingham C. & G. M. Co.'s mines, at Bingham, was shut down lately, owing to failure of Jordan Narrows electric power; old steam power compressor was substituted.——The Provo Electric Co. expects to supply Bingham with electric light and power.

On the 7th inst. the Highland Boy, at Bingham, shipped 60,098 pounds of pig copper to the Eastern refinery.

SAN JUAN COUNTY.

The Gomner M. & M. Co., Supt. S. A. McLean, has a 5-stamp mill running near La Sal.——A railroad will probably be built from Grand river to La Sal this summer.

The San Juan Oil Co., capital $100,000, is incorporated to work 160 acres of oil land 40 miles west of Bluff.

SUMMIT COUNTY.

More machinery has arrived for the new Silver King sampler, at Park City; construction work is progressing; plant will be lighted by electricity.——S. Spiro, who bought the Little Bell group, near Park City, will begin work.——Wages have been raised by the Quincy M. Co.; hereafter muckers will receive $2.75, stopers $3, and machine men $3.25 per day.

TOOELE COUNTY.

The Cyclone and Tiptop claims, at Stockton, are bonded to C. M. Pratt of Salt Lake; the properties will be examined, and, if report is favorable, work will begin.

The new machinery on the Stockton, at Stockton, consisting of air compressor, drills, hoist and an engine, is running, and sinking of main shaft will be continued to water level, when concentrators will be put in.

WASHINGTON COUNTY.

The property of the Dixie M. Co., consisting of 200 acres of copper-bearing ground and the 30-ton per day smelter, at St. George, is reported sold to the Bingham & Eastern Copper Co. of New Haven, Conn., for $200,000—$25,000 cash and balance to be paid within four months; a depth of 600 feet is attained on the property; during last December $35,000 worth of copper was turned out by the smelter.

VERMONT.

ORANGE COUNTY.

The oldest copper mine in America is said to be the Ely-Copperfield, at Copperfield, recently sold to Pittsburg, Pa., men; a railroad will probably be built this spring from the Ely mines to White River Junction, at which point it is proposed to put up large reduction and smelting works. The mine has been in operation since 1820. The main working shaft is down nearly 5000 feet on the incline. The estimated production for 1901 is given as between 7,000,000 and 10,000,000 pounds of refined copper.

WASHINGTON.

FERRY COUNTY.

Another stratum of ore, 5 feet wide, is opened up in the Wauconda tunnel at Republic. Two samples of ore gave, respectively, $11.40 and $13.60 to the ton. It is probable that a 100-ton plant will be put in this year.——Ore from the 60-foot level of the Nancy, 4 miles from Nelson, recently ran $405.39 to the ton.

Ore recently shipped from the Quilp, at Republic, to the Granby smelter, at Grand Forks, B. C., returned $35 to the ton; twenty tons of ore per week are now being shipped to Grand Forks, B. C.

LINCOLN COUNTY

The Elephant, in Cedar canyon, near Davenport, owned by the Cedar Canyon M. Co., is making regular shipments of ore.

OKANOGAN COUNTY.

The vein on the Q. S., near Loomis, shows a width of 4 feet of copper-gold ore, assaying $30 to the ton.——A 500-foot double compartment shaft will be sunk on

the Buckeye, of the Wehe Con. M. Co. Crosscutting will be done at that depth. Should developments prove satisfactory, a mill is projected.

SNOHOMISH COUNTY.

The North Star M. Co. is running a tunnel on the North Star group, 1½ miles from Index; S. A. D. Davis, manager.——Work is being pushed on the Bunker Hill-Sullivan group, near the North Star group.——Ore recently shipped from the Sunset to the Everett smelter yielded 23.8% copper.——A smelter may be built at Darrington by Colorado men.

WYOMING.

ALBANY COUNTY.

The Rambler (copper), on Douglas creek, 35 miles southwest of Laramie, is shipping three carloads of ore weekly to the Argo smelters at Denver, Colo.; the ore is a copper glance, running 27% copper, 60 cents gold and six ounces silver to the ton. Forty-five men are employed. A sulphuric acid leaching plant will probably go in this spring to treat the low-grade ore; Supt., C. Kuster.——Ore from the Baker-Swigart (copper), 35 miles northeast of Laramie, runs 35% copper to the ton.

CARBON COUNTY.

A strike of copper ore is reported made on property near the Kurtz-Chatterton, Grand Encampment.

FOREIGN.

BRITISH COLUMBIA.

Supt. Biesel of the St. Eugene at Moyie states that his company has contracted to ship ore to Antwerp, Belgium.——On the Paradise group, Windermere, twenty-two men are working.——The tunnel on the Lead Queen, on the north fork of No. 3 creek, Windermere, is in 165 feet.——The Canadian Pacific R. R. Co. has made a new tariff rate on matte and bullion from all Kootenay points to New York and Newark, N. J., of $16 per ton, a cut of $2 per ton on the former rate.——Drifting is progressing on the Phœnix at Slocan. The ore at present runs about $100 to the ton.——The Black Prince and the Darius, Dundas No. 2, Summerside, Black Prince Fraction and Four Friends claims are reported sold to the Canadian Goldfields Syndicate for $75,000, the Black Prince bringing $50,000.——Work on the Iron Horse at Slocan is resumed. The winze will be sunk to a depth of 100 feet, and ore will be sacked for shipment as sinking progresses. A 200-foot crosscut will be run at the 100-foot level. A hoist will go in immediately, and should developments prove satisfactory a mill will be erected.

MEXICO.

The Dewey, at Willard, Sonora, is shipping high-grade ore.——At the Escuadra, 9 miles from Ocotlan, Sonora, 400 men are employed; shaft is 480 feet deep; ledge at that depth is 4½ feet wide; during 1900 ore shipments amounted to $508,000 (Mexican), and cost of production, transportation, etc., was $72,400, leaving a net return of $435,600; ore is shipped to Seckback & Co. at Oaxaca; primitive methods of mining are in vogue at the mine; Kislingbury & Hamilton have the property under bond and may sell it to New York parties.——The Mexican Petroleum Co. is incorporated, to develop 400,000 acres supposed oil lands near Tampico.

QUEBEC.

The daily output of the blast furnace of the Canada Iron Furnace Co.'s plant at Radnor Forges is thirty-five tons of pig iron.——At Thetford the Beaver Asbestos Co. is putting in a new asbestos plant.——The Johnson's Co. is putting in new asbestos mills at Black Lake and Thetford.——In Black Lake district Dr. Reed will probably put in a mill on his property.——The new $250,000 plant of the Pittsburg Reduction Co. at Shawinigan Falls is completed. It will reduce aluminum from Canadian corundum ores.

SOUTH AMERICA.

The Playa El Oro M. Co. of Ecuador, owned in London and New York, is extending its ditch and pipe lines. Each monitor has a head of 240 feet and uses about 250 miners' inches; the pipe is all 22-inch. A four months' supply is assured. A third pipe line will be finished March 1.

Ecuador, S. A., Jan. 3, 1901.

THE KLONDIKE.

All claims still held by the Crown, including fractional claims, except those in litigation and those reserved for compensation, will be thrown open for location on the 27th inst., and it is reported that thereafter no more Crown reservations of mining claims in the Klondike or Northwest Territory will be made.

Considerable work is being done on Eureka creek, 40 miles from Dawson, this winter.——A private estimate gives the coming clean-up of the mines in the Klondike at from $12,000,000 to $15,000,000.

Personal.

W. B. HOLMES of Sheridan, Mont., is in England.

W. S. HASKIN is now Supt. Iron Mountain, Keswick, Cal.

SUPT. DOBLER of Shasta county, Cal., is in San Francisco.

W. E. HAMPTON of the Pacific Tank Co. goes to Honolulu.

J. A. CHESTNUT, formerly of Downieville, Cal., goes to Mexico.

J. W. NEILL has returned to Salt Lake, Utah, from a two months' trip.

PHILIP ARGALL, of Denver, Colo., will spend next summer in Europe.

T. A. RICKARD, State Geologist of Colorado, is visiting San Francisco.

P. A. H. FRANKLIN, of Salt Lake, Utah, is in Salmon City, Idaho.

C. D. ROOKLIDGE of Darwin, Cal., has returned there from San Francisco.

J. F. LANG, formerly of Shasta and El Dorado counties, Cal., is in Chicago, Ill.

A. S. COOPER'S official term as California State Mineralogist expires March 31.

D. KANE, Supt. Copper Mountain M. Co., Tecoma, Nev., goes to Denver, Colo.

MAJOR BOHN has resigned the managership of the Home M. Co., Leadville, Colo.

EDGAR RICKARD returned to California on the last Australian steamer from Tasmania.

H. W. WHIRLOW, Supt. Angels (quartz), Angels, Cal., has resigned; T. Fullen succeeds him.

MR. HASSLACHER of the Roessler-Hasslacher Co. of New York City is in San Francisco.

THOS. RAPSON succeeds Thos. Carlyon as mining captain at the Trimountain mine, Houghton, Mich.

J. W. SHARPE, manager Mulatos M. Co., Mulatos, Sonora, Mexico, has returned there from California.

R. D. HUNTER, manager Denver branch of the Sullivan Machinery Co., has returned to Denver from Chicago.

J. B. MYERS, electrician at the Ontario drain tunnel, Park City, Utah, has resigned; C. B. Blanchard succeeds him.

ROBERT CURR is in San Francisco to direct some of the work relative to the Risdon Iron Works' new ship-building plant.

F. W. EDELSTEN, formerly publisher and proprietor Mining & Metallurgical Co., is in Arizona in the interests of the Colonial Copper Co., of New York.

WM. T. ST. AUBURN, formerly Supt. Niagara mine, French Gulch, Cal., more recently in charge of Rhodesia, S. A., mining interests, has returned to Shasta Co., Cal.

HUDSON H. NICHOLSON, consulting engineer for the American Mining Investment Co. of Denver, Colo., is giving a course of lectures at the University of Nebraska at Lincoln, Neb.

JESSE J. MACDONALD, formerly in charge of the coast interests of the Gold & Silver Extraction Co. of America, Ltd., is consulting metallurgical engineer for El Almacen de las Minas, City of Mexico.

Trade Treatises.

Ore Crushing Machinery, fourth edition; illustrated description and discussion of ore-crushing appliances, with special reference to operation of modern ore-crushing plants; The Colorado Iron Works Co., Denver, Colo.

No. 17 of the series, 1901 edition, treating of gold dredging, with details of cost of operation of successful work; The Risdon Iron Works, San Francisco, Cal.

The Parker Steam Generator, alleging advance in steam boiler practice that includes unusual economic conditions; The Parker Engine Co., San Francisco and Philadelphia.

The Canadian Rand Drill Co., mostly a description of their new shops at Sherbrooke, Ontario.

Fraser & Chalmers, Chicago and London, sixth edition of their treatise on engines and boilers, with new illustrations and specifications of steam power plant accessories.

The Geo. E. Dow Pumping Engine Co., San Francisco, illustrating and describing steam pumps, electric pumps and hydraulic machinery in general, with full detailed specifications, as to efficiency and adaptability in individual cases.

Chicago Pneumatic Tool Co., Chicago, in English, German and French, showing different tools pneumatically operated.

Arthur Koppel, 66 Broad St., New York City, profusely illustrated description in English and Spanish of all manner of material required for narrow-gauge railways, with views of mines in all parts of the world which are equipped with rails, tracks, switches and cars of his make.

Trade treatises noted herein will be sent upon request by the firms issuing them except otherwise stated.

Commercial Paragraphs.

JAS. S. BROWNELL, Western agent Frue Vanning Machine Co., 132 Market St., San Francisco, Cal., reports the following sales for the past four months: Keystone Con. M. Co., Amador City, Cal., fourteen 4-foot Frue vanners; Victor Gold Mines, Brownsville, Cal., four 6-foot Frue vanners; Ribbon Rock Mines, Sonora, Cal., two 6-foot Frue vanners; App Con. M. & M. Co., Jamestown, Cal., twenty-four 6-foot Frue vanners; Gould & Curry mine, Virginia, Nev., nine 6-foot Frue vanners; the Empire Mines, Grass Valley, Cal., twelve 6-foot Frue vanners; Crystal Lake Mines, Lundy, Cal., two 6-foot Frue vanners; Wadsworth M. & M. Co., Wadsworth, Nev., one 6-foot Frue vanner; Black Oak Mine, Soulsbyville, Cal., four 4-foot Frue vanners. All of the above machines are supplied with the Brownell "patent lip" flange belts.

Recently Declared Mining Dividends.

	Payable.
Four Metals M. Co., Colo., $25,000	Feb. 20
New York & Honduras Rosario M. Co., Honduras, C. A., 20 cents per share (regular 10 cents and extra 10 cents), $30,000	Feb. 16
Mammoth M. Co., Utah, 5 cents per share, $20,000	Feb. 8
Plumbago M. Co., Cal., $12,000	Feb. 15

List of U. S. Patents for Pacific Coast Inventors.

REPORTED BY DEWEY, STRONG & CO., PIONEER PATENT SOLICITORS FOR PACIFIC COAST.

FOR THE WEEK ENDING FEB. 5, 1901.

667,383.—WASHING MACHINE—R. S. Andrews, Redding, Cal.

667,180.—WELL CASING — E. J. Bates, Bakersfield, Cal.

667,645.—BAG HOLDER — A. S. Beck, Pasadena, Cal.

667,181.—WATCH POCKET—Jennie Beebe, Los Angeles, Cal.

667,186.—GAS CUT OFF—V. E. Campbell, Winnemucca, Nev.

667,293.—FLY PAPER HOLDER—Cherry & Radke, S. F.

667,294.—FLY TRAP — Cherry & Radke, S. F.

667,303.—TRAP — G. R. Evans. Fresno, Cal.

667,206.—BEER COOLER—T. R. Faughnan, Colusa, Cal.

667,511.—ARTIFICIAL LIMB — I. R. & W. D. Fenner, S. F.

667,514.—CONCENTRATOR — G. J. Frey, Oakland, Cal.

667,214.—SOLDERING IRON HEATER — J. W. Gheen, Astoria, Or.

667,397.—EDUCATIONAL APPLIANCE — F. D. Jones, Los Angeles, Cal.

667,446.—REFRIGERATOR — R. A. Maddox, Phœnix, Ariz.

667,555.—COATED SCREW — A. W. McGahan, Los Gatos, Cal.

667,367.—PRODUCING COPPER—G. Mitchell, Jerome, Ariz.

667,400.—VEHICLE WHEEL—A. S. Moore, Galt, Cal.

667,572.—PIPE WRENCH — C. Peterson, Los Banos, Cal.

667,578.—BILL HOLDER—M. C. Robichau, S. F.

667,254.—BRIQUET MACHINE—R. Schorr, S. F.

667,255.—PRODUCING CEMENT — Schubert & Pierce, Sacramento, Cal.

667,352.—FLUSHING APPARATUS — F. Walker, Los Angeles, Cal.

667,472.—FISH TRAP—Welch & Lamley, Astoria, Or.

667,415.—STAMP DIE—Frank White, Nevada City, Cal.

667,641.—HYDROCARBON BURNER—J. D. Williamson, S. F.

667,279.—NAIL MACHINE—J. H. Yeakey, Redding, Cal.

Notices of Recent Patents.

Among the patents recently obtained through Dewey, Strong & Co.'s SCIENTIFIC PRESS U. S. and Foreign Patent Agency, the following are worthy of special mention:

ICELESS REFRIGERATOR.—No. 667,446. Feb. 6, 1901. R. A. Maddox, Phœnix, Ariz. This invention relates to an apparatus for refrigerating or cooling air within a cooling box or chamber. It consists of an inner and an outer case, one separated from the other, a fibrous covering material upon the inside frame, means for delivering water so as to flow over and moisten the fibrous covering, from which a constant evaporation will take place, and the interior of the apparatus will be kept cool. The door has a similar inner wall covered with fibrous material and a drip trough, so suspended above it that when the door is opened this trough will catch the water from above and prevent it dripping across the door opening. When the door is closed, this trough is pushed out of the way so that the water can flow down and moisten the fibrous covering. Suitable ventilating openings are applied to the apparatus, so that a constant circulation of air may take place through the apparatus, and the temperature will be reduced to a very low degree by the operation.

Latest Market Reports.

SAN FRANCISCO, Feb. 14, 1901.

SILVER—Per oz., Troy: London, 28d (standard ounce, 925 fine); New York, bar silver, 60⅞c (1000 fine); San Francisco, 60⅝c; Mexican dollars, 50c.

The troubles in China and India and the fact that the Bank of Shanghai is full of silver are given as among the reasons for the decline in price.

COPPER.—New York: Lake, 1 to 3 casks, $17.00; carload lots, 16.75; Electrolytic, 1 to 3 casks, 16.87½; carload lots, 16.35; Casting, 1 to 3 casks, 16.50; carload lots, 16.25. San Francisco: 18. Mill copper plates, 20c; bars, 22@23c.

LEAD.—New York, $4.37½; Salt Lake City, $4.00; St. Louis, $4.20; Missouri lead, $4.32½ desilverized lead; San Francisco $5.00, carload lots; 5½c 1000 to 4000 lbs.; pipe 6¾, sheet 7½, bar 6c; pig, $4.70 @5.10. London, £15 2s 6d per ton= 3.27½ cts.

SPELTER. — New York, $4.00; St. Louis, $3.75; London, £17 7s 6d per ton =3.87½ cts. per ℔; San Francisco, ton lots, 5¼c; 100-lb lots, 6c.

ANTIMONY.—New York, Cookson's, 10c; Hallett's, 9½c; San Francisco, 1000-lb lots, 12c; 300 to 500 lbs., 13@14c; 100-lb lots, 15@18c.

IRON.—Pittsburg, Bessemer pig, $13.50; gray forge, $13.30; San Francisco, bar, per lb., 2.65c in small quantities.

STEEL.—Bessemer billets, Pittsburg, $21.00; open hearth billets, $21.50; San Francisco, bar, 7c to 12c per lb.

TIN.—New York, pig, $26.45; San Francisco, ton lots, 29c; 1000 lbs., 29½c; 500 lbs., 29½c; less, 30c; bar tin, ℔ ℔, 35c.

QUICKSILVER. — New York, $51.00 large lots; London, £9 2s 6d; San Francisco, local, $47.50 ℔ flask of 76½ lbs.; Export, $44.

U. S. quicksilver exports for 1900 aggregated 778,191 pounds.

MAGNESIUM.—New York, $2.90 ℔ ℔.; San Francisco, $3.75.

ZINC.—San Francisco, 5½c; slab, 5¾c; bar, 7c; zinc dust, N. Y., 8c.

BABBITT METAL.— San Francisco, No. 1, 10c.

SOLDER. — Half-and-half, 100-℔. lots, 18½c; San Francisco, Plumbers', 100-℔. lots, 15½c.

ASSAY LITHARGE.—San Francisco, 10c ℔ ℔, small lots.

BISMUTH.—New York, ℔ ℔., $2.25 50-℔ lots; San Francisco, $2.50 to $2.75 ℔ lots.

PLATINUM.—San Francisco, crude, $17 ℔ oz.; New York, $18.20 per Troy oz

ALUMINUM.—New York, No. 1, 99% pure ingots, 35c; No. 2, 90%, 30c to 35c.

FERRO-MANGANESE. — Pittsburg, 80%, domestic, $62.50, large lots.

PHOSPHORUS.—F. o. b. New York 50@60c ℔ ℔.

POWDER.—F. o. b. San Francisco: No. 1. 70% nitro-glycerine, per ℔., in carload lots, 15½c; less than one ton, 17½c. No. 1*, 60%, carload lots, 13½c; less than one ton, 15½c. No. 1** 50%, carload lots, 11½c; less than one ton, 13½c. No. 2, 40%, carload lots, 10c; less than one ton, 12c. No. 2* 35%, carload lots, 9½c; less than one ton, 11½c. No. 2** 30% carload lots, 9c; less than one ton, 11c. Black blasting powder in carload lots, minimum car 728 kegs, $1.50 per keg; less car lots, $2 per keg.

CAPS.—3x, $5.50 per 1000; 4x, $6.50; 5x, $8; Lion, $9, in lots not less than 1000.

FUSE.—Triple tape, $3.60 per 1000 feet; double tape, $3.00; single tape, $2.65; Hemp, $2.10; Cement No. 2, $3.00; Cement No. 1, $2.65, in lots of 3000 feet and up.

CANDLES.—Granite 6s, 16 oz., 40s., 11½c ℔ set; 14 oz., 40s., 10c.

CHEMICALS.—Cyanide of potassium, 98%-99%, jobbing, 32½@33½c ℔ ℔.; carloads, 30@31c; in 10-℔. tins, 40c; sulphuric acid, in carboys, 66% B, 2c ℔ ℔.; soda ash, $1.60 ℔ 100 lbs. 58%; hyposulphite of soda, 2¾@3c ℔ ℔.; blue vitriol, 5¾@6½c ℔ ℔.; borax, concentrated, 7@8c ℔ ℔.; chlorate of potash, 12@13c; roll sulphur, 6c; alum, $1.90@2.00; flour sulphur, French, 2½@ 2½c; California refined, 1¾ @ 2c; nitric acid, in carboys, 8c ℔ ℔.; caustic soda, in drums, 3@4c ℔ ℔.; Cal. s. soda, bbls., $1.00; sks, 95c ℔ 100 lbs.; chloride of lime, spot, $2.50@2.60; nitrate of potash, in kegs, 8c; caustic potash, 10c in 40-℔. tins.

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Stillwell-Bierce & Smith-Vaile Co 18
Strout & Son, W. H 14
Sullivan Machinery Co 8

T
Tanana Mining Co 1
Tatum & Bowen 21
Taylor Iron & Steel Co 19
Taylor & Co., John 13
Taylor & Co., P. T ..... —
Thomson & Boyle Co 20
Trenton Iron Co 19
Tyler, S. W 14

U
Union Gas Engine Co 4
Union Iron Works 22
Union Pacific Railway 17
Union Photo-Engraving Co 21

V
Van Der Naillen, A 14
Van Slooten, Wm 14
Van Wagenen, Theo. F 14
Vulcan Iron Works 16

W
Wanted 1
Weber Gas & Gasoline Engine Co 21
Weigele Pipe Works ..... —
Western Chemical Co 3
Westinghouse Electric & Mfg. Co 3
Wetherill Separating Co 3
Wigmore & Sons, John 20
Wimmer, Geo 18
Wohler, Bartning Suc'rs 2
Wolff & Zwicker Iron Works 13
Wood, Henry E 13
Woodbury, Geo. E ..... —
Wynkoop, W. C 14

Y
Yawger, I. C 8
Yuba River Gold Dredging Co 20

SITUATIONS WANTED.

MINING ENGINEER WANTS POSITION. A mine superintendent. Thoroughly competent stamp mill man. References. "M. B. I.," this office.

PRACTICAL MINER and TOOL SHARPENER, fifteen years' experience in the United States and British Columbia, would like a position. Address "D," care of this paper.

Millman Desires Position.

Huntington or stamp mill. Understands concentrators. Has handled machinery for 20 years. Address E. F. CLARK, Carters, Tuolumne Co., Cal.

SITUATION WANTED by a young man who is a practical miner; understands cyanide work and is a good assayer; would like to take charge of small cyanide plant or as assistant in a large one. Good references. Address D. W., this office.

WANTED—A position as superintendent for a mining company by a man of 16 years' practical mining experience; understands mining and milling (amalgamation, concentration and leaching); good assayer and accountant; would accept a subordinate position if good; references. Address "Advertiser," 1225 Webster St., Oakland, Cal.

A position as superintendent or mining foreman by a man of 20 years' practical experience in mining in all its branches in the different mines in California and Mexico—gold, silver, copper and quicksilver mines. Have had the handling of large forces of men. Can speak Spanish. Can go through and secure any kind of ground. The best of references. D. E. F., care this office.

CHEMIST AND ASSAYER, with experience in draughting, bookkeeping and typewriting, desires position as assayer or assayer and bookkeeper in mine or as secretary to mining engineer or mine official. Has fair literary and scientific education. Experience in the preparation of reports, prospectuses and catalogues. Excellent moral character and good health. For further particulars, address E. R. M., care Mining and Scientific Press.

Mining Engineer, technical graduate, with nine years' practical experience, wishes position as manager or superintendent of mining or milling proposition. Thoroughly competent and reliable, best of references. Understands draughting, buying machinery, erecting, operating. Experience with all chemical processes, cyanide expert. Speaks Spanish, familiar with Mexico, prefer position in the U. S. Address Box 25, this office.

Situation Wanted by Mining Engineer of 20 years' experience in California, Colorado, Mexico and Germany. Has had charge of large properties—gold, silver, lead, copper, sulphur and oil. College graduate; good assayer, surveyor and accountant; speaks Spanish. Has experience in railroad construction and road building. Formerly U. S. deputy mineral surveyor and member of geological field force. Will go anywhere. Address P. M., Mining and Scientific Press.

Position as Superintendent

of a gold mine or mill desired by an experienced mining engineer and metallurgist. Competent to take full charge of a gold mine or mill. Technical graduate. Good assayer, surveyor, etc. Can leave present position on short notice. Salary moderate. Address "B. Sc.," care of this paper.

Mining Accountant and Store Manager.

A young man of energy and ability, and thoroughly experienced in all details of mine accounting, store managing, buying, contracting, etc., is desirous of obtaining an opening. Is fully qualified to assume full charge of such work or to render general assistance. Highest references will be furnished and satisfactory services guaranteed. Address B. P. O., this office.

BRITISH COLUMBIA MINES

Gold, Silver-Lead and Copper Properties. Excellent chance for profitable investments in legitimate mining in BRITISH COLUMBIA. Capital needed for developing promising prospects. A specialty made of FREE MILLING GOLD properties. Very promising FREE MILLING GOLD properties for sale; terms reasonable. Mines examined and reported on by reliable mining engineers. Correspondence solicited. Address Andrew F. Rosenberger, P. O. Box 700, Nelson, B. C.

Big Vein Cyaniding Ore IN MONTANA.

Over 12 feet wide; values $5 to $30, gold and silver. Mine can be developed cheaply by tunnels to depth of 600 feet. Many improvements; 1500 feet work done; buildings up, and good road; timber and water. Prospect for a big mine seldom equaled. Lease and bond on favorable terms. D. S. M., care this office.

Quicksilver

BY THE FLASK OR CARLOAD.

The Eureka Company,

OF SAN FRANCISCO.

330 SANSOME STREET, - SAN FRANCISCO.

HEADQUARTERS FOR

QUICKSILVER.

LOWEST RATES. Correspondence Solicited.

LANGLEY & MICHAELS CO.,

34-40 FIRST STREET, SAN FRANCISCO.

BENJAMIN T. LLOYD, STOCKS, BONDS AND MINES.

Have immediate customers for well-developed Gold and Copper Properties.

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AUTOMATIC SAMPLING

Mill Plans, Cyanide, Concentration, Smelter.

F. D. BAKER, Mech. Engr., DENVER.

FOR SALE.

SIX-FOOT FRUE VANNER, TEN-STAMP MILL, STEEL SHOES AND DIES, ETC. "C. H. J.," care this office.

GUARANTEED MINING STOCK FOR SALE.

Excellent chance for profit. No chance for loss. Can convince the most skeptical that our way of guaranteeing mining stock is perfectly safe and one of the most desirable investments. Can furnish highest grade of references. Write or call for particulars, if you wish to purchase. on

E N. BREITUNG & CO., BROKERS, Marquette, Mich. Washington, D. C.

BELTING and PULLEYS.

We can save you 50% on guaranteed Belting secured from mills which we dismantle. All sizes of wood Pulleys that are as good as new and guaranteed.

Send for Catalogue No. 37.

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22nd and Larimer Sts., DENVER, COLO.

Electric, Railway and Manufacturers' Supply Co.

548 MISSION ST.,
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RAILWAY SUPPLIES AND ELECTRICAL SPECIALTIES.

Pacific Coast Agents : : : : : : : : :
ERICSSON TELEPHONE COMPANY.

WE CARRY FULL LINE OF ABOVE GOODS.

WANTED--GOOD SECOND-HAND SET CRUSHING ROLLS.

State price and particulars to THE MOUNTAIN COPPER CO., LTD., Keswick, Shasta Co., Cal.

DELINQUENT SALE NOTICE.

TANANA MINING COMPANY.—Location of principal place of business, San Francisco, California.

Notice.—There are delinquent upon the following described stock on account of assessment (No. 2) levied on the 20th day of December, 1900, the several amounts set opposite the names of the respective shareholders, as follows:

	No. cert.	No. shares.	Amt.
Arthur H. Ten Broeck	10	250	25 00
W. C. Price	15	250	25 00

And in accordance with law, and an order from the Board of Directors, made on the 20th day of December, 1900, so many shares of each parcel of such stock as may be necessary will be sold at public auction at the office of the secretary, Edward H. Stearns, at Room 801, Claus Spreckels Building, at the corner of Third and Market streets, San Francisco, California, on WEDNESDAY, the 6th day of March, 1901, at the hour of 12 o'clock M. of said day, to pay said delinquent assessment thereon, together with costs of advertising and expenses of sale.

EDWARD H. STEARNS, Secretary.

Office—Room 801, Claus Spreckels Building, Cor. Third and Market Sts., San Francisco, California.

ASSESSMENT NOTICE.

SPANISH CONS. QUARTZ MINING COMPANY.—Location of principal place of business, San Francisco, California; location of works, Nevada County, California.

Notice is hereby given, that at a meeting of the Board of Directors, held on the 12th day of February, 1901, an assessment (No. 4) of five (5) cents per share was levied upon the capital stock of the corporation, payable immediately in United States gold coin, to the secretary, at the office of the company, 113 Crocker Building, San Francisco, California.

Any stock upon which this assessment shall remain unpaid on the 19th day of March, 1901, will be delinquent, and advertised for sale at public auction; and unless payment is made before, will be sold on MONDAY, the 8th day of April, 1901, to pay the delinquent assessment, together with costs of advertising and expenses of sale.

By order of the Board of Directors.

B. N. SHOECRAFT, Secretary.

Office—113 Crocker Building, San Francisco, California.

ANNUAL MEETING.

The Regular Annual Meeting of the Stockholders of the SPANISH CONS. QUARTZ MINING COMPANY will be held at the office of the Company, 113-114 Crocker Building, San Francisco, California, on WEDNESDAY, the 13th day of March, 1901, at the hour of 2 o'clock P. M., for the purpose of electing a Board of Directors to serve for the ensuing year, and the transaction of such other business as may come before the Meeting.

Transfer Books will close on SATURDAY, March 2, 1901, at 12 o'clock noon.

B. N. SHOECRAFT, Secretary.

Office—113-114 Crocker Building, San Francisco, California.

WE BUY very rich Ores, Dental Scraps, Tellurium Ores, Mill Wastes, Jewelers' Sweeps, Gold Retorts, Old Iron Retorts, Base Amalgam, Quicksilver, Amalgamated Plates, Gold and Silver, Old Slags.

A. M. DONALDSON & CO.,

ASSAYERS AND WASTE PRODUCT SMELTERS,

1661 Larimer St., Denver, Colo.

Donaldson's Assayers' Slag Hammer { 1 lb. ..... $1.10 / 1 lb. 3 oz. $1.25 }

Carefully Tested.

Each and every injector we make is carefully tested before it leaves our factory, and card attached showing its exact range. When you buy a

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you are getting the best injector on the market. Fully guaranteed as per card attached.

Our "Engineers' Red Book" will be valuable to you. It's free for the asking. Write us.

AMERICAN INJECTOR CO.,
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THE GARDNER ELECTRIC ROCK DRILL.

GREAT REDUCTION IN THE EXPENSE OF INSTALLING AND OPERATING ROCK DRILLS.

CALIFORNIA ELECTRICAL WORKS,
409 Market Street,
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CYANIDE 98%

Manufactured by the Roessler & Hasslacher Chemical Co., New York, for sale in quantities to suit by

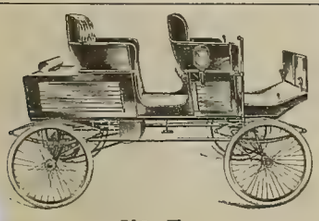
HAAS, BARUCH & CO.,
100 CALIFORNIA ST., SAN FRANCISCO, CAL.
SOLE AGENTS.

WEST COAST OF MEXICO.

WÖHLER, BARTNING Suc's, Mazatlan (Sinaloa), Mex.
Bankers, Importers, Exporters and Commission Merchants.

Representatives and Agents of the principal Mining Companies in the State of Sinaloa and the dependencies of the Pacific coast in the States of Durango, Chihuahua, Sonora, Lower California and Jalisco.

ORE BUYERS AND EXPORTERS. - MINING SUPPLIES.


No. 5.

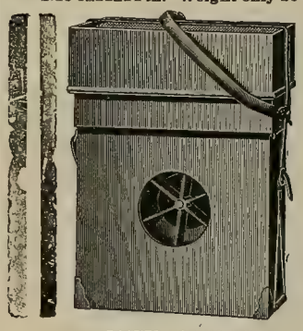
The "Locomobile" Company OF THE PACIFIC.

STATIONS: 1255 Market Street, San Francisco. 103 South Broadway, Los Angeles. 106 Telegraph Avenue, Oakland.

Your choice in nine different styles. Ladies can operate them. Sold in guaranteed condition at reasonable prices. Illustrated catalogues and information will be sent on application.

DRY PLACER MACHINES.

THE PNEUMATIC PROSPECTOR.
Size 6x11x14 in. Weight only 10 lbs.



PACKED FOR MOVING.

NO WATER NEEDED.

Gives a clean prospect from placer ground or ree-milling ore by compressed air. The operation s purely mechanical. No chemicals, no quicksilver; no black sand remains with the gold. Will work equal to careful panning.

THE PNEUMATIC SEPARATOR.
Weight 160 lbs.

Has a capacity of 20 to 30 cu. yds. of gravel per day. Will save fine and coarse gold and nuggets of any size, comparatively free from black sand. Will do better work under favorable circumstances than a sluice box. Indispensable for dry countries

SEND FOR DESCRIPTIVE CIRCULAR.

P. P. CUPLIN.
Inventor and Manufacturer,
WEST BEND, IOWA, U. S. A

Notice of Removal.

On or About MARCH 15th
NEXT THE
JUSTINIAN CAIRE COMPANY
WILL REMOVE THEIR STOCK OF
Assayers' Materials, Chemicals and Mill Screens
To Their NEW BUILDING at
565-567 MARKET STREET,
SAN FRANCISCO, CAL.

COLORADO'S GOLD

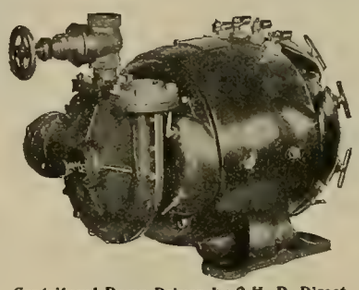
Output for 1899 is unequaled by any State in the Union. Cripple Creek, Leadville, and all the important mining towns are reached by

THE COLORADO & SOUTHERN RY...

For copies of our publications on the Swandyke and Pine Creek Gold Districts, or our pamphlet "Hints to Prospectors," address

T. E. FISHER, GEN. PASS. AGT., DENVER, COLO.

General Electric Company's

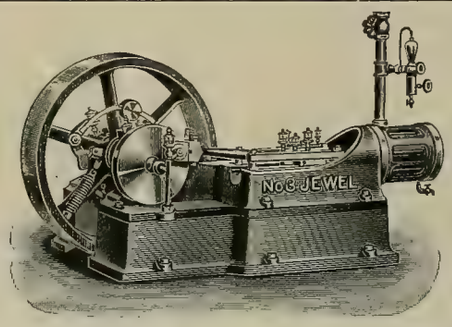

Centrifugal Pump Driven by 2 H. P. Direct Current Motor.

Electric Pumps

can be readily shifted to any part of the mine without expense or delay, and can be controlled by an operator placed in the most advantageous position.

General Office: Schenectady, N. Y.
San Francisco Office: Claus Spreckels Bldg. Denver Office: Kittredge Building.

JEWEL ENGINES



A THOROUGHLY RELIABLE, SIMPLE, HIGH CLASS, PERFECTLY GOVERNED AUTOMATIC ENGINE AT A REASONABLE PRICE.

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SAN FRANCISCO, SACRAMENTO, LOS ANGELES.

W. H. BIRCH & CO.

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WRITE FOR A CIRCULAR ON THE

"BIRCH" Improved Two-Stamp Mill.

IRON FRAME. TRIPLE DISCHARGE. 850-LB. STAMPS. FORGED STEEL SHOES AND DIES.

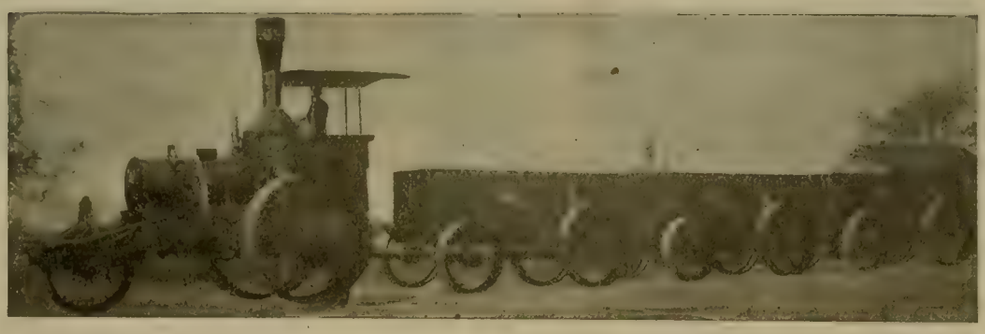
Price, $450 f. o. b.

Manufacturers of the LIGHTNER QUARTZ MILL.

CLOT & CRIST MACHINE CO.
MODERN EQUIPPED SHOP,
Prepared to Design, Build or Repair STEAM ENGINES, STEAM OR ELECTRICALLY DRIVEN PUMPS, AND MACHINERY OF ALL KINDS.
137-139 Beale St., San Francisco, Cal. Telephone James 1781.

"THE DANIEL BEST"
50-Horse Power Traction Engine.

Freight carrying capacity of wagons, 16 TONS EACH, or a total capacity of train, 48 TONS.



CAPACITY OF ENGINE, 50-Horse Power.

Over One Hundred of these Powerful Engines in use on this Coast in the principal Logging and Lumbering Camps and for general freighting purposes.

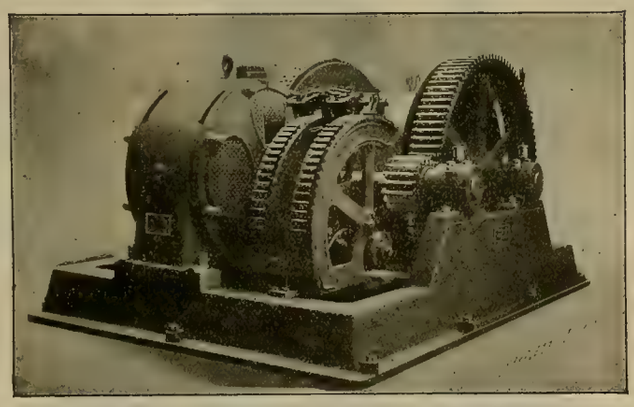
EVERY ONE A SUCCESS AND MONEY MAKERS.

These outfits are particularly adapted to haul freight of any description from out-of-the-way places, and will reduce the cost of transportation at least one-half and in many instances two-thirds. They can generally be worked where animal teams now do the work, and haul their immense loads of from thirty to fifty tons, ascending and descending grades as much as 5 per cent to 30 per cent, depending upon condition of the road; loads may be increased to even greater amount on a firm and moderately level road.

Send for Descriptive Circulars and Price List. Wagons are built which are best suited for the kind of freight to be handled.

Estimates made for complete Steam Freighting Outfits. Address

THE BEST MANUFACTURING COMPANY,
San Leandro, California.



Westinghouse Induction Motor Operating Mine Hoist.

Westinghouse Induction Motors

are operating machinery in all principal mining districts and under the most adverse conditions.

Westinghouse Electric & Manufacturing Co.

All Principal Cities in U. S. and Canada.

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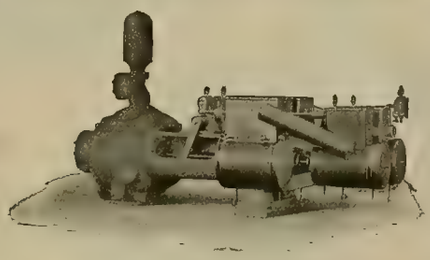
CHAS. C. MOORE & CO.,
ENGINEERS,

AND DEALERS IN : : : :

High Grade Machinery.
COMPLETE PLANTS INSTALLED.

32 First Street,

Branches—Los Angeles, Seattle. San Francisco, Cal.



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The Babcock & Wilcox Company,
PATENT WATER TUBE

STATIONARY **BOILERS** MARINE

CHAS. C. MOORE,
MANAGER.

32 FIRST STREET, SAN FRANCISCO, CAL.

Are You Confronted With a Difficult Ore-Separating Problem?
THE WETHERILL MAGNETIC SEPARATING PROCESS may prove the solution. Apply to Wetherill Separating Company, 52 Broadway, N. Y.

STRICTLY **C. P. ACIDS** and **C. P. AMMONIA**

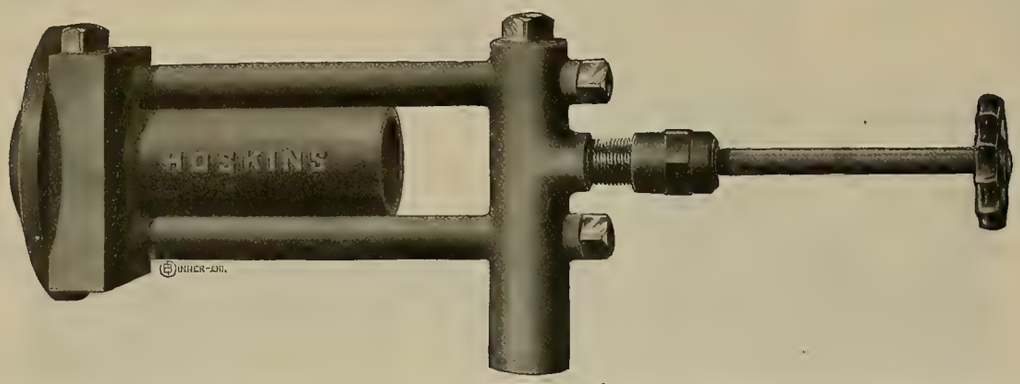
MANUFACTURED BY The Western Chemical Co., DENVER, COLO.

For Laboratory Use and Fine Chemical Work

PURITY GUARANTEED.

Also COMMERCIAL ACIDS.

We introduced the use of Liquid Fuel Furnaces for Assaying twenty years ago, and received the only award and medal for Hydro-Carbon Blow-Pipes and Assay Furnaces at the World's Fair in 1893. We are still manufacturing



Hoskins' Standard Hydro-Carbon Burner

FOR ASSAY FURNACES.

Always guaranteed and cleaned or repaired FREE of charge.

For sale by Dealers in Assayers' Supplies everywhere, or by Ourselves.

All inquiries fully answered. Write for circulars and prices of our TIME PROVEN FURNACES FOR ASSAYERS.

WM. HOSKINS & CO.,
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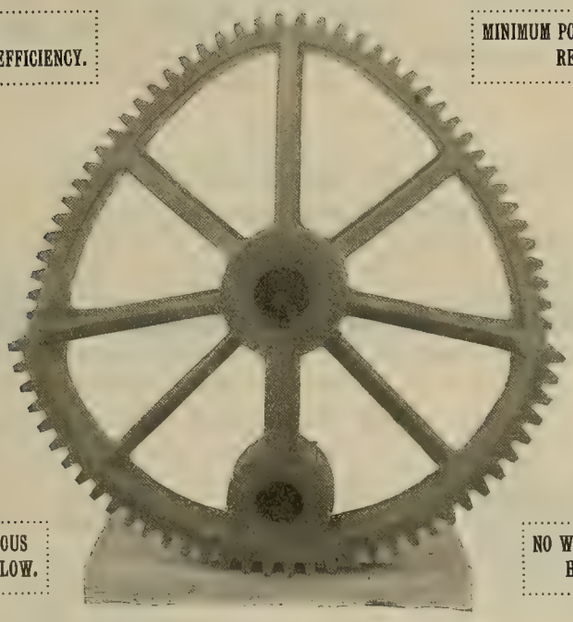
THE GEAR THAT MADE THE

FULTON PUMP

RENOWNED.

HIGHEST EFFICIENCY.

MINIMUM POWER REQUIRED.



CONTINUOUS FLOW.

NO WATER HAMMER.

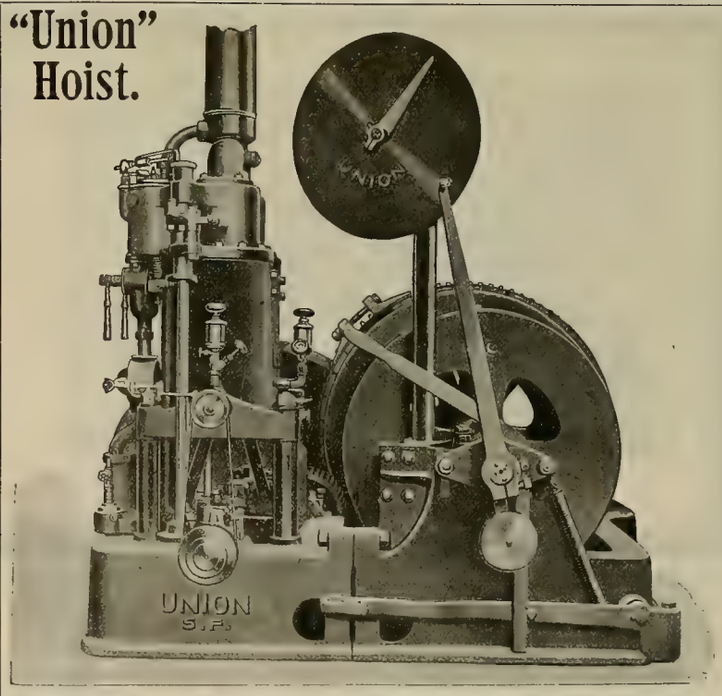
If your LIFT PUMP is not a

FULTON PUMP

you haven't a continuous flow Pump.

Manufactured by A. T. AMES, GALT, CAL.

"Union" Hoist.



The above illustrates the 25 H. P. double cylinder, single drum "Union" hoist, with all the latest improvements.

THE UNION GAS ENGINE CO.

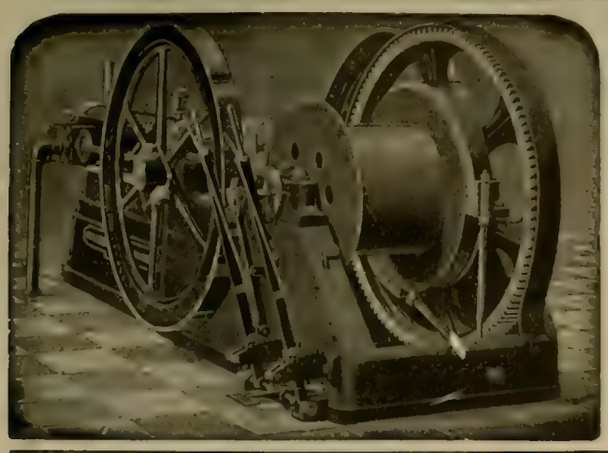
—BUILD THE—

"Union" Gas Engines,

Which use either MANUFACTURED or NATURAL GAS, ORDINARY STOVE GASOLINE (NAPHTHA or BENZINE), DISTILLATE or KEROSENE.

STATIONARY ENGINES for All Kinds of Work in Sizes from 3 to 300 h. p. in actual use.
"UNION" COMBINED HOISTS in Sizes from 2 to 130 h. p. in actual use.
"UNION" COMBINED COMPRESSORS—20, 30, 40 h. p.
HOISTS and COMPRESSORS Can Be Built in Larger Sizes to Order.
"UNION" MARINE ENGINES, 4 to 200 h. p., of Single, Double and Four-Cylinder Types.
FIFTEEN YEARS' EXPERIENCE Building Gas and Oil Engines.
"UNION" ENGINES Are In Use All Over the United States.
"UNION" ENGINES Are Simple, Durable and Economical.

Office, 248 First Street. Works, Corner First and Clementina Streets. SAN FRANCISCO, CAL.



FAIRBANKS-MORSE GASOLINE-DISTILLATE GEARED HOISTER.

An efficient and reliable combination of a Fairbanks-Morse Gasoline-Distillate Engine on the same base with a Friction Hoist. Modern and up to date. We publish a special catalogue describing our Hoister which we gladly mail prospective purchasers.

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ALL SIZES UP TO AND INCLUDING 54 HORSE POWER.
For Pumping, Milling, Lighting, Air Compressors, Etc.

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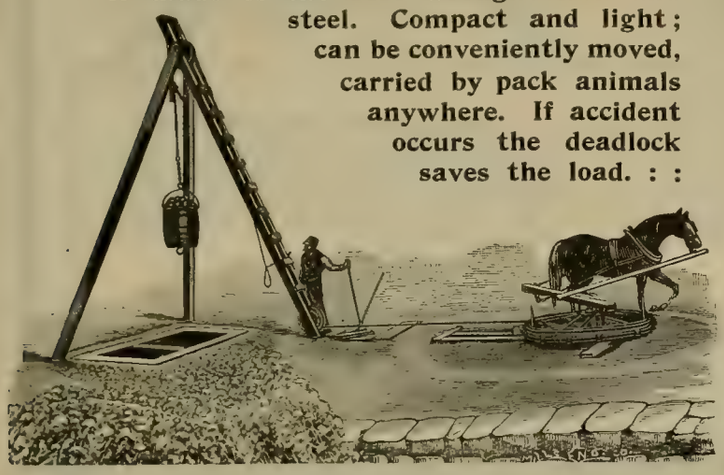
THE COMMON SENSE WHIM

Is made of the best wrought iron and steel. Compact and light; can be conveniently moved, carried by pack animals anywhere. If accident occurs the deadlock saves the load. : :



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Indispensable in sinking mining shafts or pumping out flooded mines. Easily raised or lowered by cable or rope. Equipped with outside packed plungers. Handles gritty or dirty water. Operates bolted to shaft timbers or only suspended by cable at any angle. Packing glands external. May be adjusted while in motion. Removable parts hinged. Steam movement positive and simple.

THE RISDON IRON WORKS,

MANUFACTURERS.

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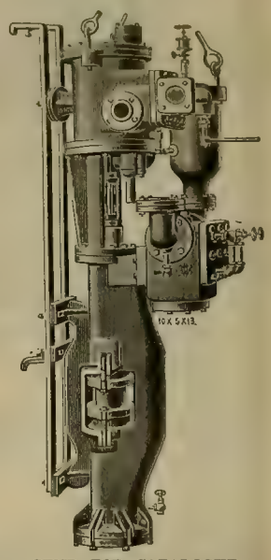
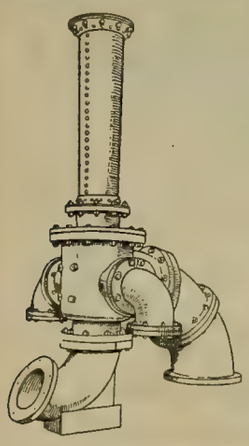


SEND FOR CATALOGUE.



THE EVANS HYDRAULIC ELEVATOR,

MANUFACTURED BY

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Used in Unwatering the Comstock Lode.

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The cheapest and most efficient Water Elevator made.
It will do more and better work than any other Gravel Elevator.
It is fully protected by United States and Canadian letters patent.

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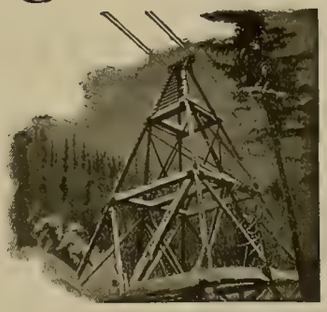
DENVER, - - COLORADO.

Mining and Milling Machinery and Supplies.

We beg to call your attention to

THE FINLAYSON PATENT WIRE ROPE TRAMWAY—

the latest and best system of double-rope automatic aerial tramway in the market.
If interested in the most economical system of transporting ores from mine to mill and to shipping stations, send for our special tramway catalogue.



We carry a complete stock of Machinery and Supplies for immediate delivery.

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THE MINE AND SMELTER SUPPLY CO.,.....Denver, Colorado
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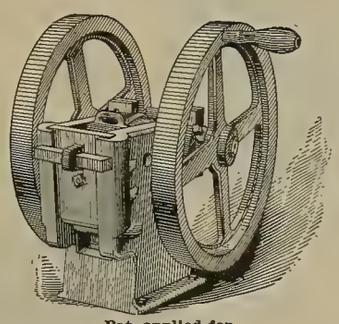
No. 16 San Francisco St., City of Mexico.

BOILERS, ENGINES, STEAM HOISTERS, ELECTRIC HOISTERS, ROLLS, CRUSHERS, WILFLEY TABLES, CARS, CAGES, ORE BUCKETS, RAIL, PIPE, FITTINGS, BELTING, ETC., ETC.

DEWEY, STRONG & CO., Patent Agents, 330 Market St., S. F., Cal.

Time, Labor and Money Saved for Assayers.

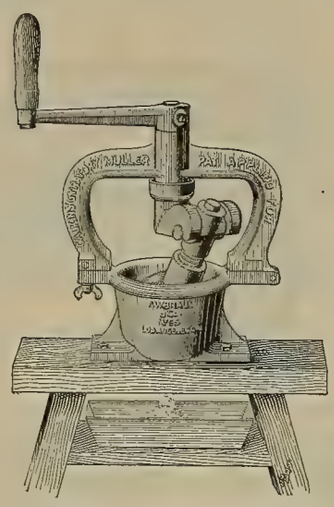


Pat. applied for.

THE SIMPLEX ORE CRUSHER.

For crushing and pulverizing small quantities of ore by either hand or power. It is more easily operated than any other machine of its capacity on the market.

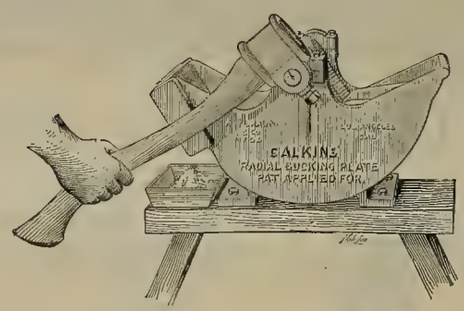
Its features are ease of opening for cleaning and simplicity of adjustment.



CALKINS' GYRATORY MULLER.

A recent invention for reducing crushed ore samples to a pulp. Will quickly pulverize to 100 mesh or finer.

Supersedes the slow and laborious Bucking Plate.



CALKINS' RADIAL BUCKING PLATE.

Designed to replace the old method of pulverizing crushed ore samples to a pulp of any desired fineness with but a fraction of the energy required to operate the old style Bucking Board and Muller.

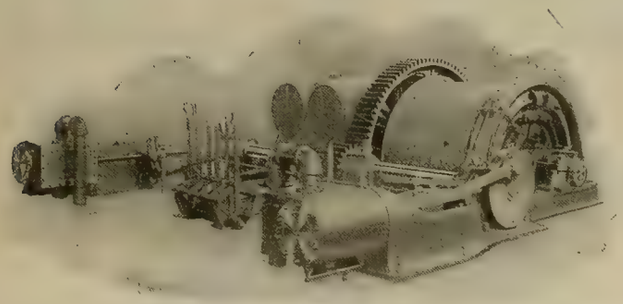
WRITE FOR OUR NEW DESCRIPTIVE PAMPHLET IN WHICH : ALL OUR NEW SPECIALTIES ARE FULLY DESCRIBED. :

F. W. BRAUN & CO.,

Manufacturers of Modern Appliances for Assayers,

LOS ANGELES, CAL.

EXTRA HEAVY DOUBLE DRUM SECOND MOTION HOIST.



DO YOU REQUIRE A

HEAVY DUTY GEARED HOISTING ENGINE?

IF SO, WRITE TO US.

We have a large line of patterns for these plants and will build you one to meet your exact requirements and for ROUND OR FLAT ROPE.

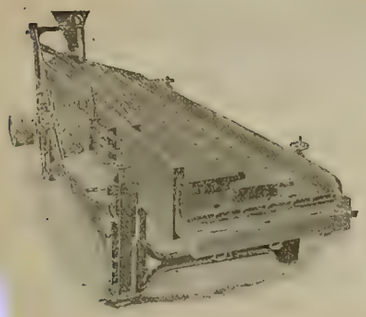
Our stock of Boilers, Pumps, Compressors, Drills and General Mine Supplies is unequaled in the United States.

YOUR CORRESPONDENCE IS SOLICITED.

The Hendrie & Bolthoff M'f'g & Supply Co.

No. 34. DENVER, - - - - - - COLORADO.

THE IMPROVED BARTLETT CONCENTRATING TABLE.



The only table made that will take the place of jigs and do away with costly and complicated machinery.

Especially designed for separating zinc from lead.

Solid Iron Tops, planed to a true surface.

All parts are interchangeable.

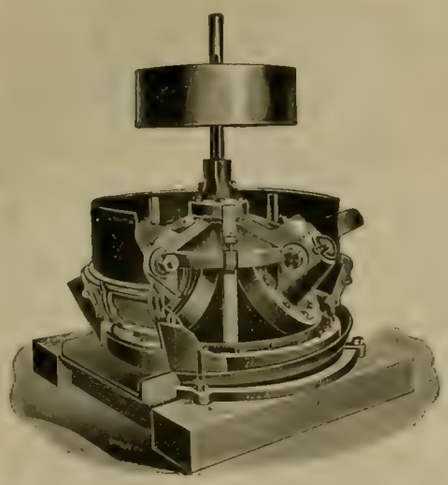
Wearing parts reduced to a minimum.

Capacity from 15 to 45 tons in 24 hours, according to class of ore.

Our illustrated catalogue contains all the latest information on the concentration of ores. Mailed on application.

THE COLORADO IRON WORKS CO.,

Established 1860. DENVER, COLO., U. S. A.



THE GRIFFIN
THREE ROLLER
ORE MILL.

The Griffin Three Roller Ore Mill is a simply constructed Mill, suitable for working all kinds of ores that require uniformly fine crushing by the wet process. This Mill is a modification of the well-known Chilian Mill, but the rollers run upon a crushing ring or die, which is inclined inwardly at an angle of about 30 degrees, the rollers themselves also being inclined to the central shaft of the Mill, thus utilizing the centrifugal force, as well as the weight of the rollers themselves as a crushing agent. The Griffin Three Roller Ore Mill is therefore a Mill of great strength, and has few wearing parts. We construct these Mills with extreme care, using only the best of raw materials, which are most carefully worked by men who are specialists as mill builders. We sell the Griffin Ore Mill on its determined merits, and will gladly supply full information regarding it to any one.

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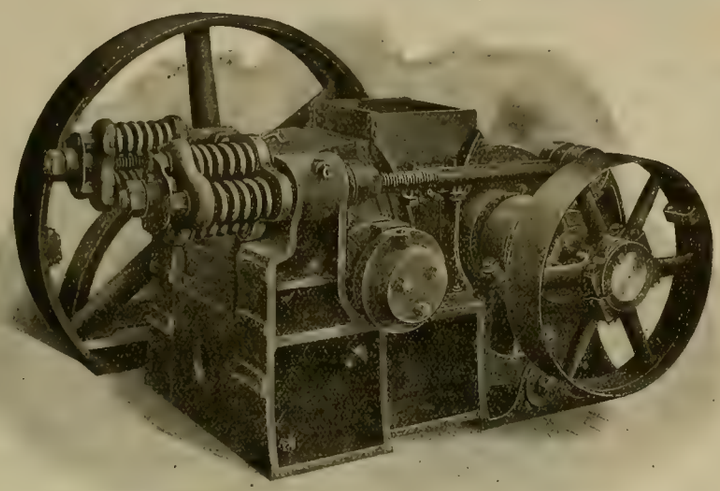
MILWAUKEE, WISCONSIN, U. S. A.



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The . . . . Reliance . Crushing . Roll . . .

Which represents the highest type of Modern Roll Construction

ALSO A COMPLETE LINE OF

Mining, Milling and Smelting Machinery.

Leschen Co.'s {Patent Aerial} {WIRE ROPE} TRAMWAY

FOR TRANSPORTATION OF ORE, COAL, DIRT, TIMBER, ETC.

Perfect Grip Clip,
Absolutely Safe,
Loads Automatically,
Unloads Automatically,
Operated by One Man,
Cost of Maintenance Low,
Capacity Largest Obtainable.

ALSO SOLE MANUFACTURERS
PATENT FLATTENED STRAND

HERCULES WIRE ROPE

[TRADE MARK REGISTERED.]

—AND—

Wire Rope

OF EVERY DESCRIPTION,

MANILLA, SISAL, BLOCKS, ETC.

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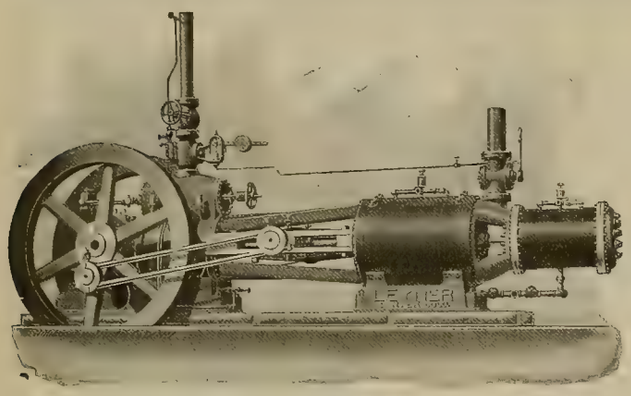

TAKE A LOOK AT IT==

THEN LOOK again! It will bear inspection. Designed for strength and endurance as well as efficiency. Provided with adjustable steam cut-off and automatic governor. Fitted with relief valve. Extra large bearings throughout. Our own improved (patented) inlet valves. Perfectly balanced steam valve. Both cylinders water-jacketed. Perfect inter-cooler.

WHY NOT HAVE THE BEST? It Pays.

Complete specifications would interest you, and we know you would be interested also in the booklet which describes our

NEW LEYNER DRILL.

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If you are interested in prospecting send for our new Diamond Drill Catalogue (No. 33).

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THE RAND DRILL COMPANY,

PIONEERS IN ROCK DRILLING AND AIR COMPRESSING MACHINERY,

128 BROADWAY, NEW YORK.
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THREE GOLD MEDALS

at the

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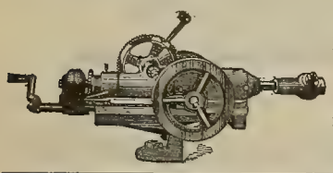
AIR COMPRESSORS and ROCK DRILLS.

THE NEW JACKSON HAND POWER ROCK DRILL.



Made of Steel. Guaranteed against breakage for two years.

H. D. CRIPPEN, Sole Manufacturer,
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(BLACK DIAMONDS)

For DIAMOND DRILLS and all Mechanical Purposes.

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Established 1837.

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IMPORTER OF CARBONS FOR DIAMOND DRILLS.

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FOR PROSPECTING.
AMERICAN DIAMOND ROCK DRILL CO.
120 LIBERTY ST N.Y.

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FOR PROSPECTING. Catalogue 29.

The most extensive line of sizes and styles ever offered.

CONTRACTORS FOR PROSPECTING WITH DIAMOND DRILL.

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Superior valve and ratchet motions. The highest possible grade.

Send for Our New Catalogues.

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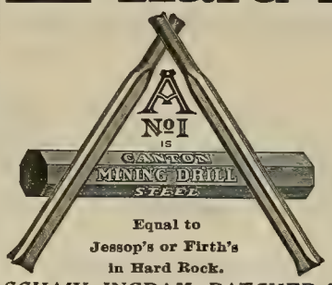
FOR **Hard Rock Work**



Equal to Jessop's or Firth's in Hard Rock.

Canton Extra Drill Steel

WARRANTED

Will be found the cheapest and most satisfactory brand in the market. Unlike many American steels, every bar is **Hammered, not Rolled,** thus making it far superior both in TOUGHNESS AND DURABILITY.

SCHAW, INGRAM, BATCHER & CO., SACRAMENTO—SAN FRANCISCO.
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FIRTH'S DRILL STEEL.

USE THE BEST.

Has no equal in Hard Rock Drilling.

ABNER DOBLE COMPANY, GEN. AGTS.,
FREMONT AND HOWARD STS., SAN FRANCISCO.

Sold by Seattle Hardware Co., Seattle, Wash.

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C E ENGINEERS PURCHASING & FORWARDING AGENTS B Co.

Six FIVE FOOT Huntington Mills

TOGETHER WITH NECESSARY

CRUSHING AND POWER PLANT.

Will Be Sold as Separate Items or Entire Mill.

PRESENT LOCATION: NEAR DEADWOOD, SOUTH DAKOTA.

Used Less Than Three Months. Guaranteed in Splendid Condition.

WILL NAME PRICES F. O. B. DEADWOOD, CHICAGO, OR DELIVERED AS DESIRED.

SPECIFICATIONS (Condensed).

6 ORE GATES, 24 x 38, rack, hand wheel, frames, bolts, complete.
2 ORE BINS, all necessary bolts, rods, nuts and washers.
2 GRIZZLEYS, 4′ x 10′, 1″ openings.
6 CHALLENGE AUTOMATIC ORE FEEDERS, including hoppers, wood frame, shafts and pulleys.
6 HUNTINGTON CENTRIFUGAL ROLLER MILLS, 5′ diameter, all fixtures and fittings, complete with wooden frame, shafts, pulleys and gearing.
6 COPPER TABLES, 6′ x 12′, ⅛″ copper, electroplated 1 oz. of silver per square foot.
2 AMALGAM SAFES.
1 BELT TIGHTENER, complete with pulley, boxes, etc., for main belt.
1 BELT TIGHTENER, complete with pulley, boxes, etc., for crusher.
1 CORLISS ENGINE, built by Fraser & Chalmers, cylinder 20″ diameter by 48″ stroke, complete in every particular, shaft 10″ in diameter, band flywheel 16′ diameter, 30″ face; weight, 42,000 pounds.
3 HORIZONTAL TUBULAR BOILERS, 54″ diameter, 16′ long, complete with steam drums 30″ x 72″, mud drums 18″ x 66″ for each boiler, breechings, smoke box, stack 48″ diameter 60′ long, all necessary guy rope, half arch fronts, grate bars, cast and wrought iron parts necessary for setting, feed, blow off check and safety valves, gauges and all fittings. Weight, 51,000 lbs. At present these boilers are arranged for setting in one battery. We will make any changes required, furnishing stacks and other items necessary to set each boiler separately.
1 HEATER, tubular, 30″ diameter, complete, with exhaust pipe.
2 NO. 5 KNOWLES BOILER FEED PUMPS.
1 BERRYMAN HEATER, 18″ diameter by 7′ long, copper tubes, 4″ pipe inlet and outlet.
1 HOOKER VERTICAL SINKING PUMP, 14x8x14, 6″ suction 5″ discharge.
8 ORE CARS, one ton capacity each.
1 WATER WHEEL, 50 H. P.
1 16″ BULLION FURNACE, complete, including 10″ Gold Retort, stack and all iron work.
1 NO. 5 STYLE B GATES FINE CRUSHER.
1 LOT REPAIR PARTS FOR HUNTINGTON MILLS, including roller shells, ring dies, scraper bars, shoes, screens, clamping plates, all new, never used.
1 LARGE LOT OF PIPE AND FITTINGS.
1 LOT BOLTS, WASHERS, RIVETS AND NUTS.
1 LOT OF MISCELLANEOUS SHAFTING, PULLEYS, PILLOW BLOCKS, HANGERS, ETC.
120′ RUBBER BELTING, 28″, 6-ply.
58′ RUBBER BELTING, 18″, 4-ply.
150′ RUBBER BELTING, 16″, 4-ply.
70′ RUBBER BELTING, 14″, 4-ply.
2 LOCOMOTIVES, 20″ gauge, built by H. K. Porter Co., Pittsburgh, one 6x10 cylinders, the other 8x14 cylinders, both saddle tank.

FOR FULL INFORMATION AND PRICES, APPLY TO : : :

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All Offers Subject to Previous Sale. CHICAGO, ILL.

The Only **GRAND PRIX** (Highest Award)

Given at the PARIS EXPOSITION, 1900, to Builders of

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Was Awarded to this Company. In Addition to the GRAND PRIX,

The **GOLD MEDAL** was also Awarded.

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THE GARDNER ELECTRIC ROCK DRILL.

One to two horse power operates this drill. Costs less than any power drill to install. Saves over 50% in cost of power. Cuts as much rock as any air drill. Send for circular and testimonials to

The Gardner Electric Drill and Machinery Co.,
1725 to 1731 Blake St.,
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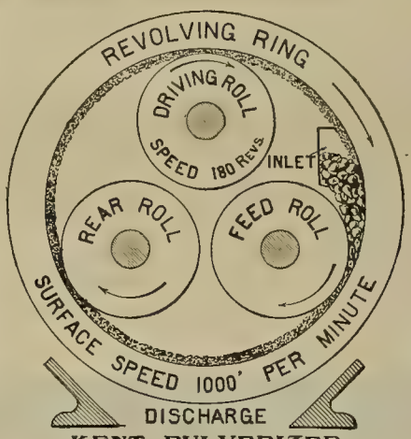


KENT PULVERIZER.

A Dry Pulverizer

FOR ORES, CEMENT and HARD SUBSTANCES.

Equals a 50-ton stamp mill. Grinds to any mesh under 8.
No slimes, no choking. Takes any fineness of feed under 1 in.
No special foundation. No quartered belts.
No internal screens. Outside separation gives 100 per cent product most uniform and granular.
No oil in product. No stoppages for oiling or adjusting.
Can be used wet. Can be moved on a truck.
Guaranteed for one year. Free new for worn out parts.
Little wear, no duplicate parts, no breakdowns.
Cost ¼ to 1-10 of any installation of same capacity.
Takes only one-half the horse power. Is automatic.

For Particulars and Catalogue

KENT MILL CO., 5 Beekman St., NEW YORK.

THE SNODGRASS HAND POWER COMMON SENSE PULVERIZER & CONCENTRATOR.

This Hand Power Machine is built on the same general principle as the regular machines, only being smaller in size and capacity. While this is intended to be run by hard power, it can easily be changed for steam or gasoline by simply putting on the pulley in place of the gearing. This has a capacity of 1½ to 2 tons per hour This is just the machine for working at Cape Nome and other places where it is difficult to procure wood, coal, or gasoline for power. It requires but a small amount of water, and a pump can be attached, so that one person can pump the water as well as run the machine. It can easily be moved from place to place, as the heaviest part only weighs about 250 lbs., the total weight being about 500 lbs.

Address S. K. SNODGRASS, DENVER, COLO. (The Windsor.)

C. H. EVANS & CO., Machine Works,

183-185-187 FREMONT STREET,

Where, with Enlarged and Increased Facilities, they are better than ever prepared to do

First-Class Machine Work

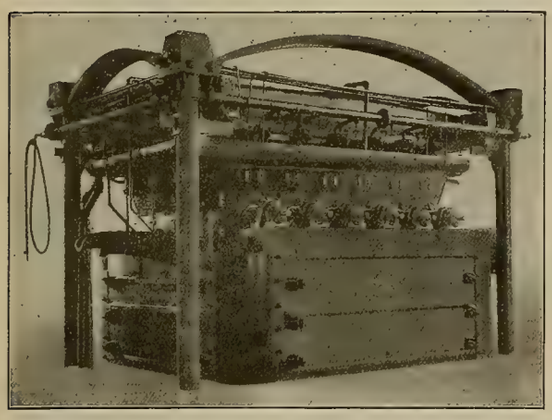
Promptly, and at Reasonable Prices, and will continue the manufacture of

Thomson & Evans Steam Pumps,

Deep Well Pumps, Power Pumps, Etc.,

Also Marine Engines, Ship and Steamboat Work, Pipe Cutting, General Jobbing and Repairing.

THE COLORADO IRON WORKS COMPANY,



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Smelting Furnaces and Equipments.

The illustration in this advertisement shows one form of our COPPER MATTING FURNACE, employing hot blast; the air being first treated in proper appliance, is conducted through the cast iron bustle pipes placed along the inside of the caisson plates, through the cast iron adjustable tuyeres. This furnace can also be used for silver as well as copper smelting, by changing lining in crucibles. We build them in any size required.

Cold blast may be used if preferred.

The furnace is equipped with our special cast iron jackets, and our patented system of water-jacketed mantles.

Send for our catalogue, showing many different styles of smelters for the treatment of

GOLD, SILVER, LEAD, COPPER AND NICKEL ORES,

also the latest and best method for the economical use of jacket water (a saving of 80% to 90% guaranteed) by our patented

WATER VAPORIZING ATTACHMENT.

We design, manufacture and erect Mills for Concentration and Amalgamation, Milling, Chlorination and Cyanide Processes. In writing for information, give us the analysis or character of the ore to be treated, to enable us to intelligently arrive at the proper method.

Our very complete catalogue of CRUSHING MACHINERY will be sent on application.

THE COLORADO IRON WORKS COMPANY,

ESTABLISHED 1860. DENVER, COLORADO, U. S. A.

P. & B. Ready Roofing.

Practical--because it outlasts tin, iron, shingles, shakes and slate; it is not affected by steam, gases, fumes, acid, smoke, heat, cold or moisture; will not scale, sun crack nor run; is a non-conductor and keeps the building at an even temperature. Anyone can apply it—nails, cement, paint and all necessary appliances for laying go with each roll.

Portable--P. & B. Roofing comes in rolls—compact and easily transported, low freight classification; one roll contains enough roofing to cover 200 square feet and weighs about 120 lbs.

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Works:
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NONPARIEL ANTI-FRICTION METAL.

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BEST ANTI-FRICTION METAL FOR ALL MACHINERY BEARINGS. FOR HIGH SPEED AND HEAVY CRUSHING WEIGHT IT HAS NO EQUAL.

THEO. HIERTZ & SON, Sole Manufacturers, MONTROSE AVE. AND PARK AVE., ST. LOUIS, MO.

Manufacturers of all grades Babbitt Metals, Solder, Bar Tin, Bar Lead, Lead Car Seals, Pig Tin, Pig Lead, Antimony, Copper, Spelter, etc.

TO SECURE GOOD RESULTS BUY

JESSOP'S STEEL

FOR TOOLS, MINING DRILLS, ETC.

Chief American Office, 91 John St., New York, N.Y.

Wm. Jessop & Sons, Ltd. Manufactory, Sheffield, England.

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LIBERTY BELL GOLD MINING COMPANY,
KANSAS CITY, MO., U. S. A.
ARTHUR WINSLOW, GEN'L MANAGER AND CONSULTING ENGINEER
100 WEST 9TH ST., KANSAS CITY
J. W. MERCER SUPT.
TELLURIDE, COLO.

Telluride, Colo., Jan. 22/19 01.

Globe Iron Works,
Stockton, Cal.

Gentlemen:--

We hereby place with you, order for Globe Guides for seven batteries of five stamps each, of the same dimensions and character as the set which you sent us last fall. We are pleased to say that these guides have given us entire satisfaction, and we intend to replace all of the guides on our old batteries with your pattern.

Kindly advise how soon you can ship this order

Yours truly,
LIBERTY BELL GOLD MINING COMPANY

By Arthur Winslow
General Manager.

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AND COMPLETE

CYANIDE PLANTS.

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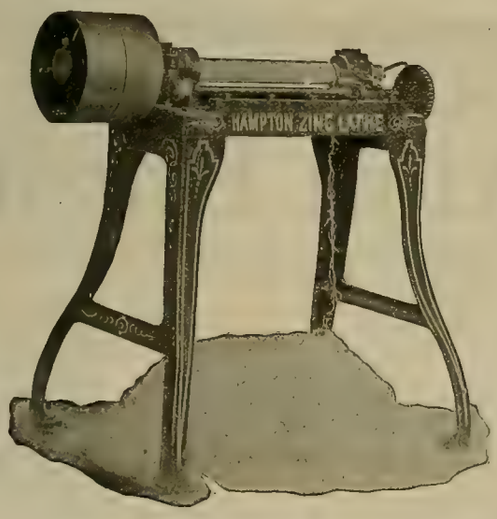

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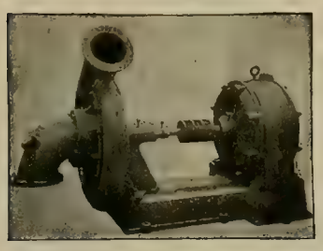
Zinc Lathes with Automatic Feed

FOR CUTTING ZINC SHAVINGS.

Pacific Tank Co., Manufacturers.

348 East Second Street, Los Angeles, Cal.

35 Beale Street, San Francisco, Cal.



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—FOR—

Mine Draining or Hydraulicking.

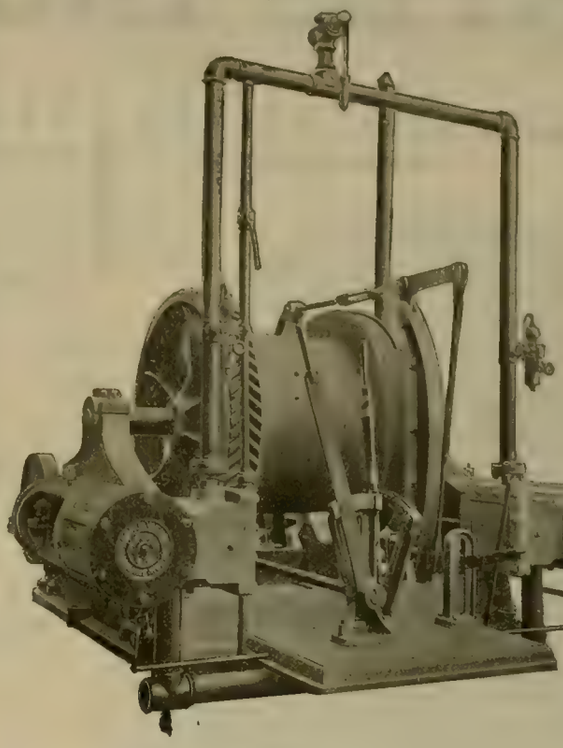
WE DESIGN PUMPS FOR ALL CONDITIONS.

WRITE FOR CATALOGUE.

BYRON JACKSON MACHINE WORKS, - SAN FRANCISCO, CAL.

Joshua Hendy Machine Works,

Nos. 38 to 44 Fremont St., San Francisco, Cal.



MINING, MILLING, HOISTING AND PUMPING MACHINERY.

HYDRAULIC MINING AND SAWMILL MACHINERY.

ENGINES, BOILERS, PUMPS.

ORE and WATER BUCKETS.

SKIPS, MINING CARS, TEE RAIL.

Write for Prices and Catalogues.

DOUBLE CYLINDER SINGLE DRUM HOISTS.

The above form of Hoisting Engine has certain features of construction which make it superior to all others. It is mounted on a single solid base, with standboard for the operator. The engines are reversible link-motion and the drum is fitted with post-brakes which assures quick and safe operation. The design is compact and superior and the construction strong and substantial. We furnish them either with or without clutch pinions. The above cut illustrates an 8½ inch by 10 inch. Other sizes in stock and built to order.

IMPROVED GOLD DREDGES

OF THE SINGLE LIFT, CONTINUOUS BUCKET TYPE WITH

Working Capacity from 1500 to 5000 cubic yards per day,

AS DESIGNED AND MANUFACTURED BY

THE BUCYRUS COMPANY, South Milwaukee, Wis.

IMPROVED GOLD SAVING DEVICE of highest efficiency.

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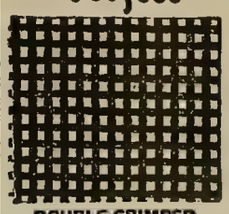

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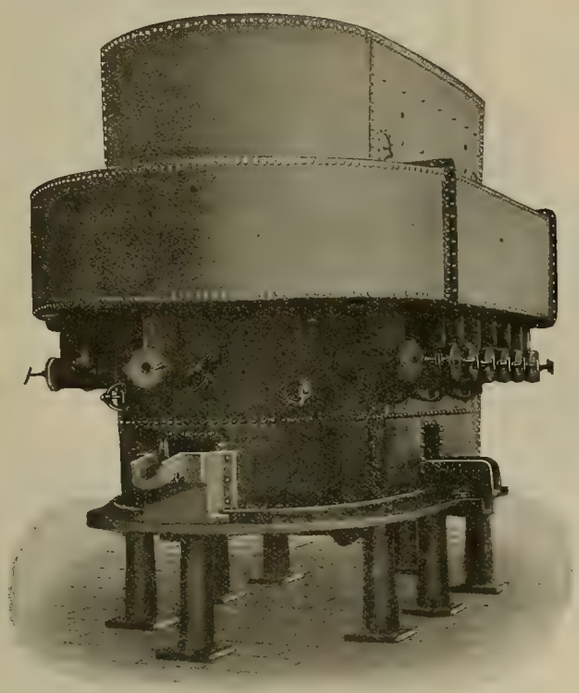

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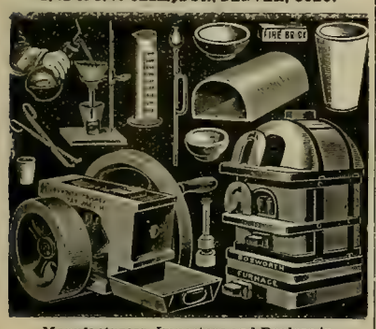

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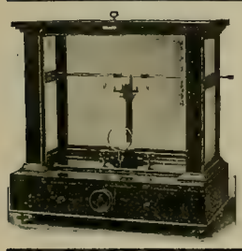

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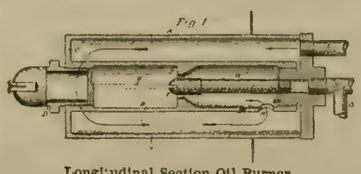

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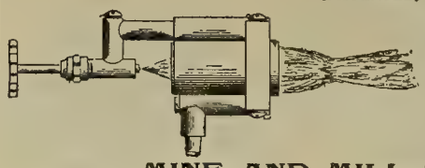

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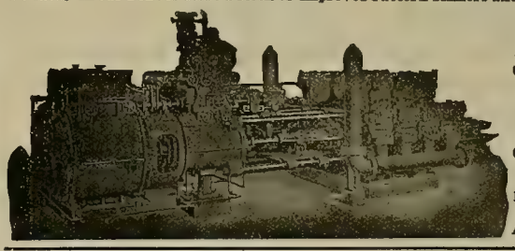

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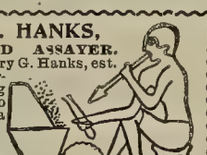

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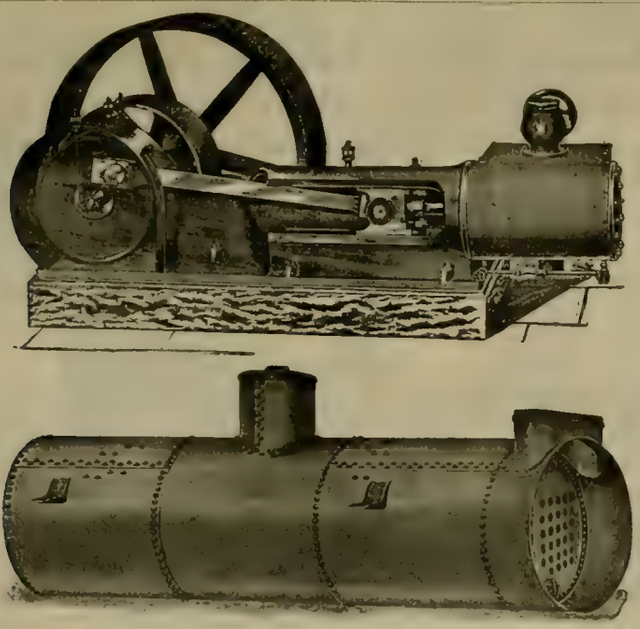

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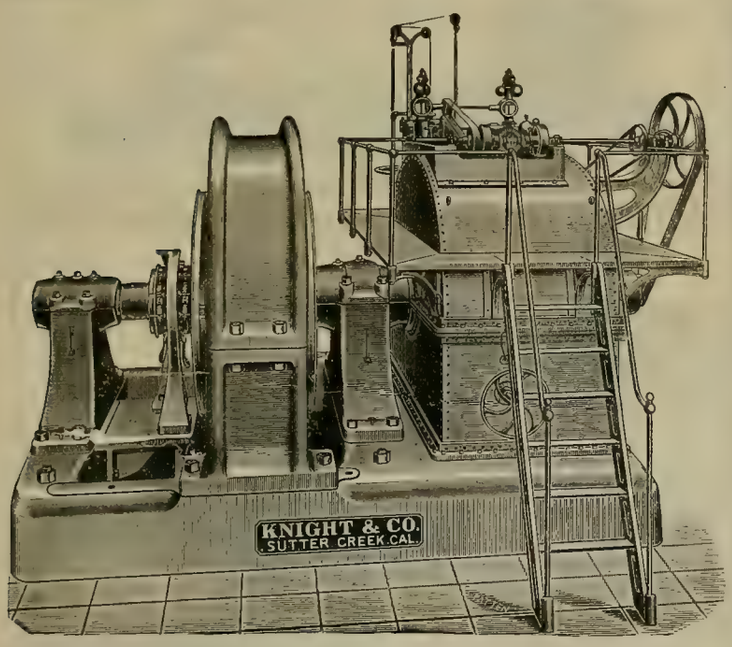

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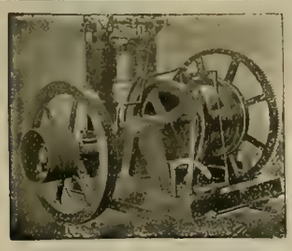

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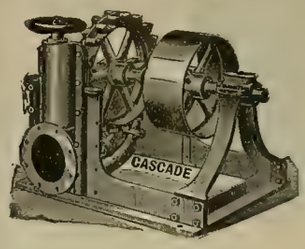

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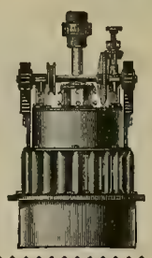

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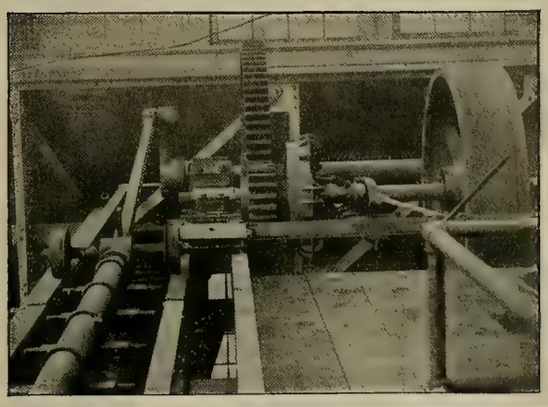

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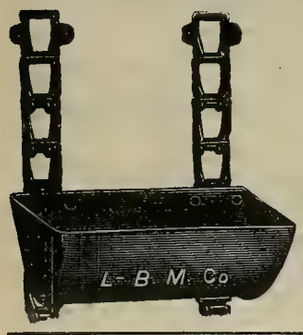

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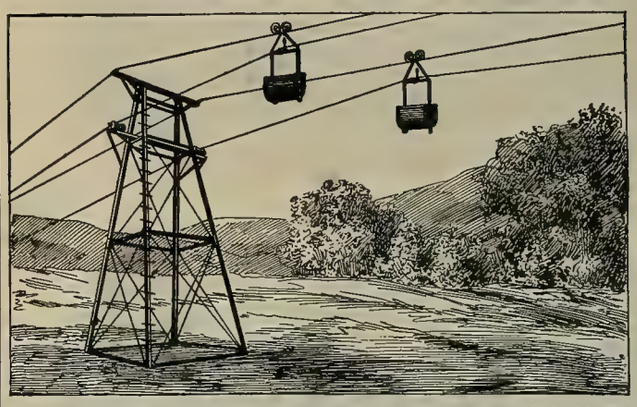

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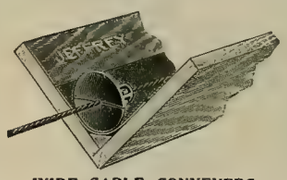

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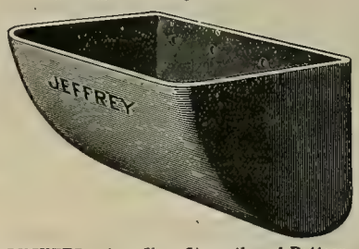

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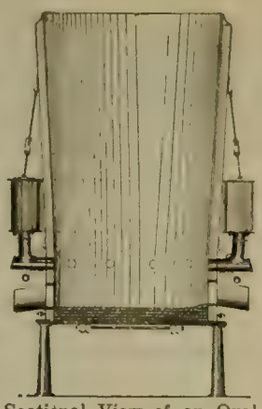

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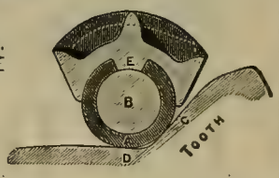

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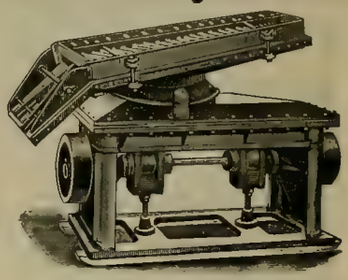

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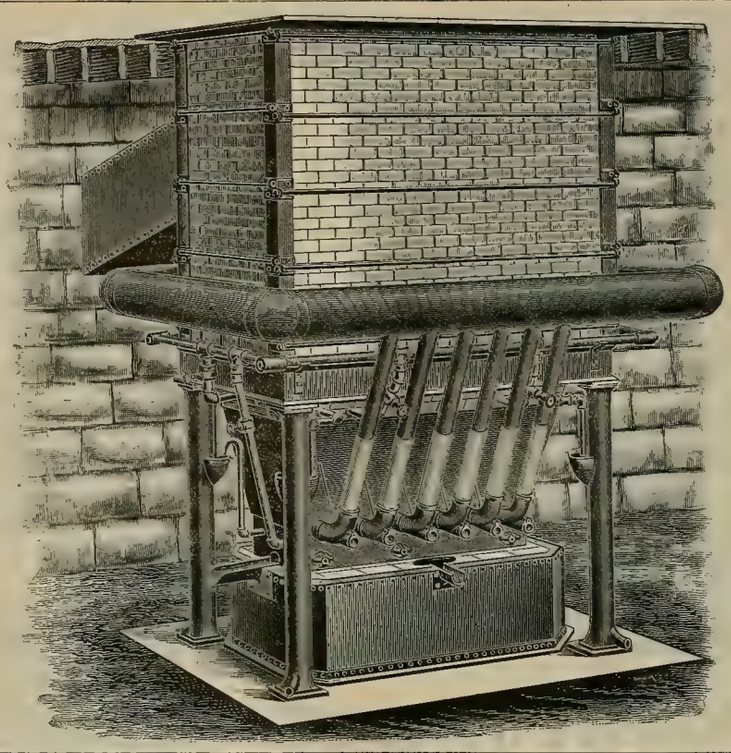

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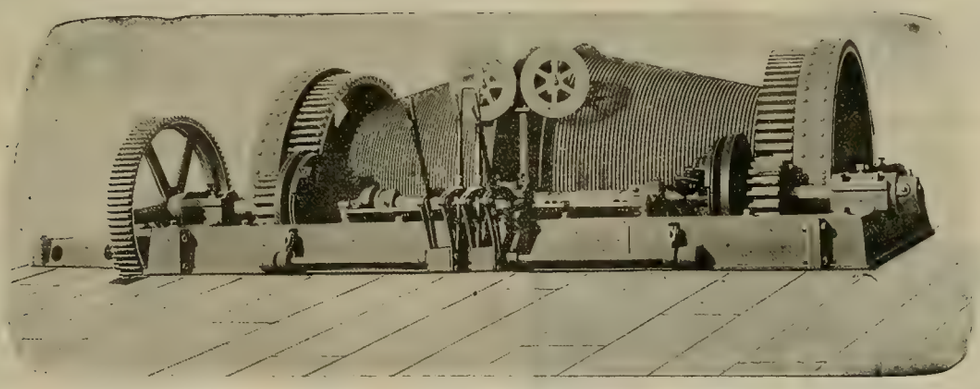

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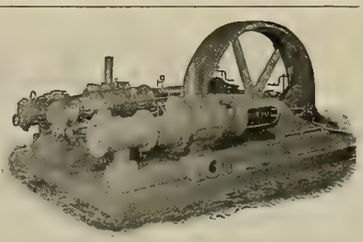

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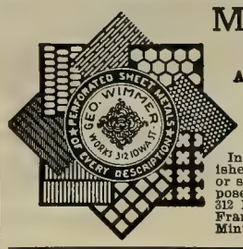

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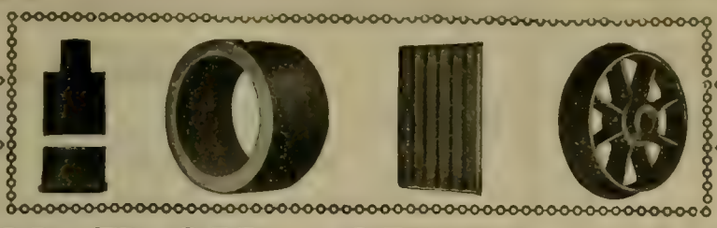

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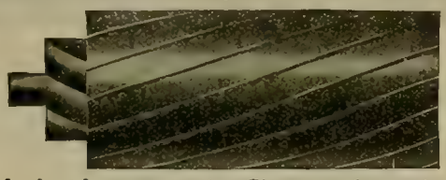

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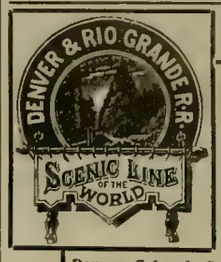

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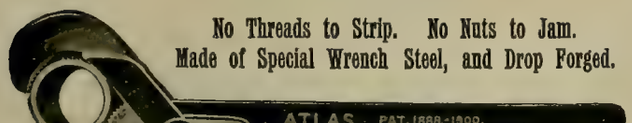

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ASSESSMENT NOTICES.

ALLIANCE EXPLORATION & MINING COMPANY.—Location of principal place of business, San Francisco, California; location of works, Ophir, Placer County, California.

Notice is hereby given, that at a meeting of the Board of Directors, held on the 12th day of February, 1901, an assessment (No. 3) of two (2) cents cents per share was levied upon the capital stock of the corporation, payable immediately in United States gold coin, to the secretary, at the office of the company, 236 Sutter street, San Francisco, California.

Any stock upon which this assessment shall remain unpaid on the 18th day of March, 1901, will be delinquent, and advertised for sale at public auction; and unless payment is made before, will be sold on MONDAY, the 8th day of April, 1901, to pay the delinquent assessment, together with the costs of advertising and expenses of sale.

By order of the Board of Directors.

S. GOLDSMITH, Secretary.

Office—236 Sutter street, San Francisco, California.

MARIPOSA COMMERCIAL AND MINING COMPANY.—Location of principal place of business, San Francisco, California; location of works, Mariposa County, California.

Notice is hereby given, that at a meeting of the Board of Directors, held on the 24th day of December, 1900, an assessment (No. 20) of Ten ($10) Dollars per share was levied upon the capital stock of the corporation, payable immediately in United States gold coin, to the secretary, at the office of the company, 320 Sansome street, room 24, San Francisco, California.

Any stock upon which this assessment shall remain unpaid on the 11th day of February, 1901, will be delinquent, and advertised for sale at public auction; and unless payment is made before, will be sold on SATURDAY, the 2nd day of March, 1901, to pay the delinquent assessment, together with the costs of advertising and expenses of sale.

By order of the Board of Directors.

JOSEPH H. MOOSER, Secretary.

Office—320 Sansome street, room 24, San Francisco, California.

LARKIN MINING COMPANY.—Location of principal place of business, San Francisco, California; location of works, El Dorado County, California.

Notice is hereby given, that at a meeting of the Board of Directors, held on the 18th day of January, 1901, an assessment (No. 9) of two (2) cents per share was levied upon the capital stock of the corporation, payable immediately in United States gold coin, to the secretary, at the office of the company, 112 Main street, San Francisco, California.

Any stock upon which this assessment shall remain unpaid on the 25th day of February, 1901, will be delinquent and advertised for sale at public auction; and unless payment is made before, will be sold on MONDAY, the 18th day of March, 1901, to pay the delinquent assessment, together with the costs of advertising and expenses of sale.

By order of the Board of Directors.

N. F. REMINGTON, Secretary.

Office—112 Main street, San Francisco, California.

DELINQUENT SALE NOTICE.

YUBA RIVER GOLD DREDGING COMPANY.—Location of principal place of business, San Francisco, California; location of works, Smartsville, Yuba County, California.

Notice.—There are delinquent upon the following described stock, on account of assessment (No. 2) levied on the 4th day of January, 1901, the several amounts set opposite the names of the respective shareholders, as follows:

Names.	No. Cert.	No. Shares.	Amt.
Henry Hilp	4	5	$0 15
Albert Moch	8	2,000	60 00
A. W. Goldsmith	9	2,000	60 00
H. L. Frank	14	1,000	30 00
H. L. Frank	15	1,000	30 00
H. L. Frank	16	1,000	30 00
H. L. Frank	17	1 000	30 00
H. L. Frank	18	1,000	30 00
H. L. Frank	19	1,000	30 00
H. L. Frank	20	1,000	30 00
H. L. Frank	21	1,000	30 00
H. L. Frank	22	1,000	30 00
Henry Hilp	28	500	15 00
M. E. Mayer	32	500	15 00
Hannah Heringhi, Trustee	33	300	9 00
S. Belasco, Trustee	34	200	6 00
Ed. Belasco, Trustee	35	200	6 00
Sarah Mayer, Trustee	36	200	6 00
I. Belasco	37	250	7 50
S. Belasco	38	100	3 00
Rose Haas	39	200	6 00
E Heringhi, Trustee	40	200	6 00
Mark Thall	41	200	6 00
Louis Heringhi	48	100	3 00
Martin Freund	49	500	15 00
G. A Kornberg	66	10,000	300 00
G. A. Kornberg	67	10,000	300 00
G. A. Kornberg	68	10,000	300 00
G A. Kornberg	72	1,000	30 00
G. A. Kornberg	73	1,000	30 00

And in accordance with law, and an order from the Board of Directors, made on the 4th day of January, 1901, so many shares of each parcel of such stock as may be necessary, will be sold at public auction at the office of the company, Room 31, No. 214 Pine street, San Francisco, California, on TUESDAY, the 5th day of March, 1901, at the hour of 2 o'clock P. M. of said day, to pay said delinquent assessment thereon, together with costs of advertising and expenses of sale.

ALBERT CERF, Secretary.

Office—No. 214 Pine street, Room 31, San Francisco, California.

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DELINQUENT SALE NOTICE.

AMERICAN OIL AND REFINERY COMPANY.—Location of principal place of business, San Francisco, California. Location of works, Contra Costa County, California.

NOTICE.—There are delinquent upon the following described stock, on account of assessment (No. 2) levied on the 26th day of November, 1900, the several amounts set opposite the names of the respective shareholders, as follows:

Names.	No. Cert.	No. Shares.	Amt.
Abbott, William	720	50	$2 50
Abbott, William	721	50	2 50
Abbott, William	722	50	2 50
Abbott, William	723	25	1 25
Abbott, William	734	25	1 25
Anthony, J. C., Trustee	797	1,000	50 00
Anthony, J. C., Trustee	798	1,000	50 00
Anthony, J. C., Trustee	799	1,000	50 00
Anthony, J. C., Trustee	973	1,000	50 00
Anthony, J. C., Trustee	1021	4 300	215 00
Dignan, J. P	1039	1,000	50 00
French, Mrs. Mary L	385	2	10
Goodenough, S	1044	380	19 00
Holbrook, W. E., Trustee	897	10 000	500 00
Holbrook, W. E., Trustee	898	11,000	550 00
Holbrook, W. E., Trustee	899	4 500	225 00
Holbrook, W. E., Trustee	900	4,500	225 00
Kielhofer, Mrs. Louis	298	2	10
Kraehmer, Louis L	471	3	15
Laird, Mrs. L. N	230	5	25
Lord, Mrs. Leona E	327	2,000	100 00
Lucas, Mrs. T. R	848	10	50
Mayer, Mrs. L	406	800	40 00
Massey, James B	914	1	05
McKeivey, Mrs Angelina	71	12	60
McAllister, H. L	1071	100	5 00
Pope, Wm	656	50	2 50
Pope, Wm	695	20	1 00
Pope, Wm	764	30	1 50
Pope, Wm	908	20	1 00
Raht, Julia F	321	25	1 25
Raht, Julia F	453	40	2 00
Rachel, Mrs. Ellza	856	400	20 00
Royce, Lizzie A	441	5	25
Russell, G. E	125	3	15
Stover, W. M	1047	480	24 00
Truitt, J. J	399	5	25
Walser, Mark	858	1,000	50 00
Walser, Mark	859	1,000	50 00
Walser, Mark	860	1,000	50 00
Walser, Mark	861	1,000	50 00
Walser, Mark	863	500	25 00
Walser, Mark	867	500	25 00
Walser, Mark	868	500	25 00
Walser, Mark	869	500	25 00
Walser, Mark	870	500	25 00
Walser, Mark	871	500	25 00
Walser, Mark	872	500	25 00
Walser, Mark	921	50	2 50
Walser, Mark	926	5,000	250 00
Walser, Mark	927	5,000	250 00
Walser, Mark, Trustee	596	500	25 00
Walker, Mrs. S. E. D. E	375	120	6 00
Young, R	761	328	16 40

And in accordance with law, and an order from the Board of Directors, made on the 26th day of November, 1900, so many shares of each parcel of such stock as may be necessary, will be sold at public auction at the office of said corporation, in Rooms 322-323 Parrott building, San Francisco, California, on MONDAY, the 28th day of January, 1901, at the hour of 1 o'clock P. M. of said day, to pay said delinquent assessment thereon, together with costs of advertising and expenses of sale.

J. C. ANTHONY, Secretary.

Office—Rooms 322-323, Parrott building, San Francisco, California.

POSTPONEMENT.

By order of the Board of Directors, the day of sale of the above delinquent stock has been postponed to MONDAY, the 11th day of February, 1901, at the hour of 1 o'clock P. M., at the office of said corporation in Rooms 322-323 Parrott building, San Francisco, California. J. C. ANTHONY, Secretary.

POSTPONEMENT.

By order of the Board of Directors, the day of sale of the above delinquent stock has been postponed to MONDAY, the 25th day of February, 1901, at the hour of 1 o'clock P. M., at the office of said corporation in Rooms 322-323 Parrott building, San Francisco, California. J. C. ANTHONY, Secretary.

DELINQUENT SALE NOTICE.

SILVER KING MINING COMPANY.—Location of principal place of business, San Francisco, California; location of works, Pioneer Mining District, Pinal County, Arizona Territory.

Notice.—There are delinquent upon the following described stock, on account of assessment (No. 22) levied on the 13th day of December, 1900, the several amounts set opposite the names of the respective shareholders, as follows:

Names.	No. Cert.	No. Shares.	Amt.
Geo. C. Hickox	7285	5	$1 25
F. A. Berlin	7286	5	1 25
Paul A. Ryman	7338	100	25 00
Paul A. Ryman	7339	100	25 00
John Turnbull, Trustee	7357	100	25 00
John Turnbull, Trustee	7358	50	12 50
J. W. Pew, Trustee	7375	100	25 00
J. W. Pew, Trustee	7376	100	25 00
J. W. Pew, Trustee	7377	100	25 00
J. W. Pew, Trustee	7378	100	25 00
J. W. Pew, Trustee	7379	100	25 00
John W. Pew	7395	5	1 25
F. Avery	7396	5	1 25

And in accordance with law, and an order from the Board of Directors, made on the 13th day of December, 1900, so many shares of each parcel of such stock as may be necessary, will be sold at public auction at the office of the company, No 310 Pine street, room 36, San Francisco, California, on TUESDAY, the 19th day of February, 1901, at the hour of 1 o clock P. M. of said day, to pay said delinquent assessment thereon, together with costs of advertising and expenses of sale.

J. W. PEW, Secretary.

Office—310 Pine street, room 36, San Francisco, California.

DELINQUENT SALE NOTICE.

MAY DAY GOLD & SILVER MINING COMPANY.—Location of principal place of business, San Francisco, California; location of works, Calaveras County, California.

Notice.—There are delinquent upon the following described stock, on account of assessment (No. 5) levied on the 30th day of November, 1900, the several amounts set opposite the names of the respective shareholders, as follows:

Names.	No. Cert.	No. Shares.	Amt.
William H. Chapman	42	100	$5 00
Thos. A. DeLay	48	600	30 00
Thos. A. DeLay, Trustee	88	6 000	300 00
Thos. A. DeLay, Trustee	90	5,000	250 00

And in accordance with law, and an order from the Board of Directors, made on the 30th day of November, 1900, so many shares of each parcel of such stock as may be necessary, will be sold at public auction, at the office of the company, at Heald's Business College, No. 24 Post street, San Francisco, California, on TUESDAY, the 19th day of February, 1901, at the hour of 1 o'clock P. M. of said day, to pay said delinquent assessment thereon, together with costs of advertising and expenses of sale.

EDWARD H. STEARNS, Secretary.

Office of Company—Heald's Business College, 24 Post St., San Francisco, California.

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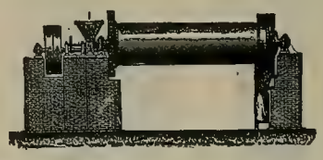

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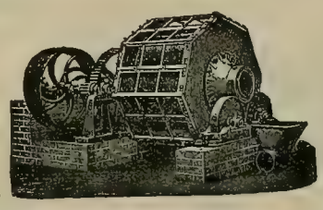

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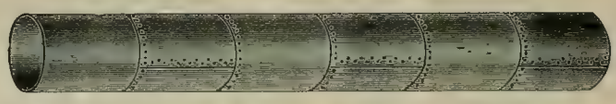

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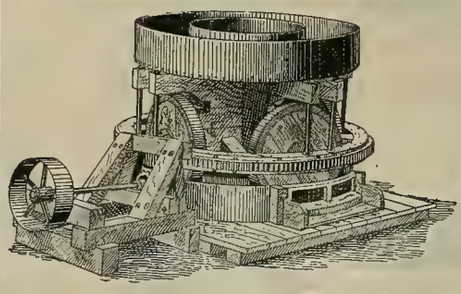

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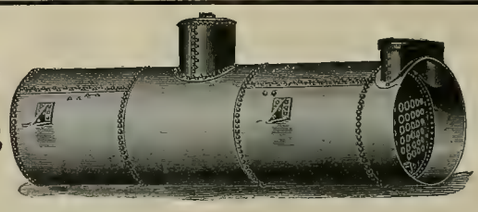

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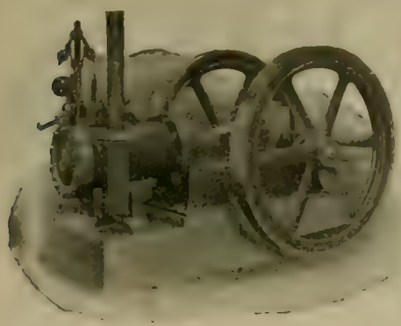

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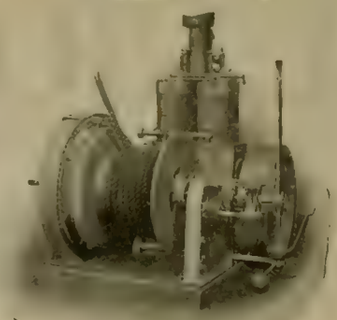

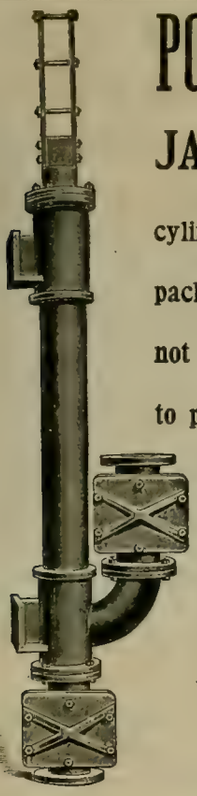

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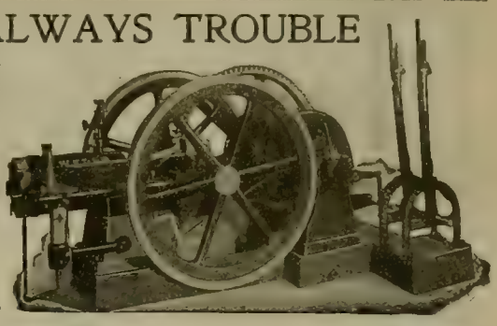

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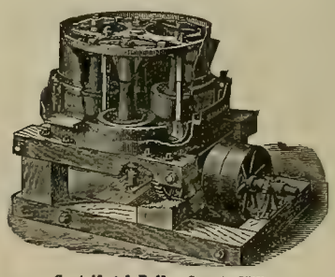

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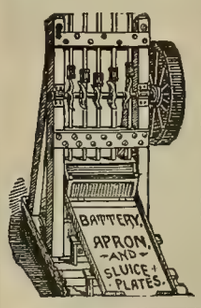

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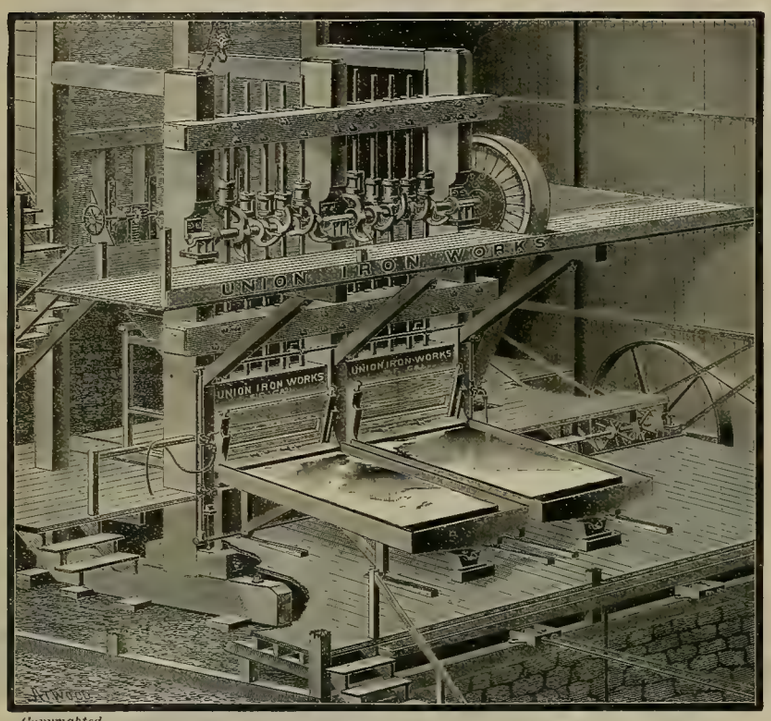

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The illustration shows the details of a modern 10-stamp battery of the back-knee type, driven by belt and tightener from a shaft located upon the battery frame sills below the mortars and plainly illustrates not only the battery and its various parts, but also shows the ore-bin gate, feeders, copper apron plates and water piping, all in their relative positions.

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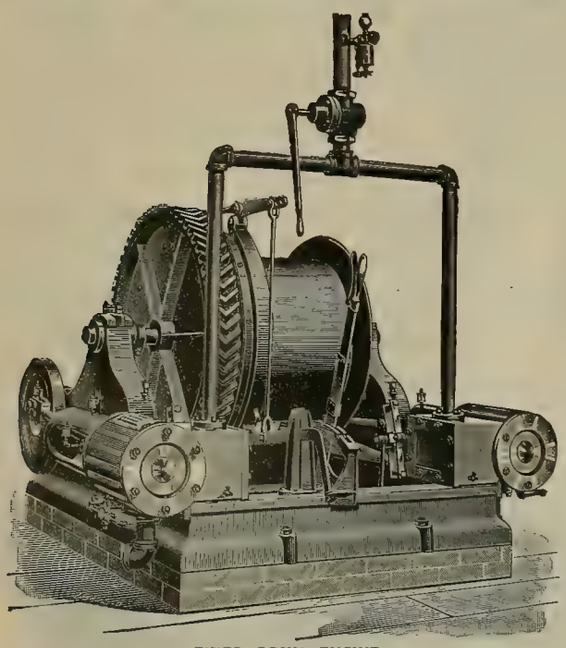

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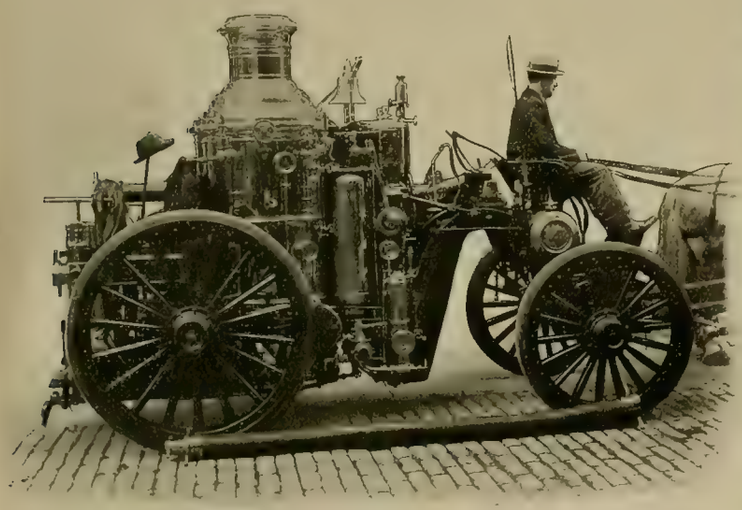
A Twenty-four-Horse Team Freighting in Eastern Oregon. (See Page 105.)



Steam Fire Engine Equipped With Electric Hose Signals, Showing Battery and Bell Just Behind the Driver's Seat. (See Page 105.)

At a New Hampshire Mica Mine. (See Page 104.)

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THE following would be a good law for the present California Legislature to pass: SECTION 1. Every miner shall have the right of way across any and all mining claims for the purpose of hauling quartz and all mineral-bearing ores, wood, timber, and all supplies for mining purposes to and from his claim. SEC. 2. This Act shall take effect immediately.

RECENTLY, in answer to a question, this paper stated that it did not know of any tin being commercially produced at present from any mine in the United States. F. H. Carpenter of Deadwood, S. D., says that "there is enough tin in the Bear Gulch, S. D., mining district to supply the United States with tin indefinitely," which is important if true. He says "in many miners' cabins there are to be found piles of cassiterite, the accumulations of a dozen summers." The further statement is made that New York and Philadelphia men have bought a group of tin-bearing claims in the district named, and will put in a 150-ton concentrating plant. Mr. Carpenter further states that he "has sat by the hour breaking tin ore on one of the big tin ledges in the Bear Gulch district, in a vain effort to find a piece of rock that did not carry tin values," and that "there are numerous ledges of tin ore in the Bear Gulch district that will average from 2% to 5% tin." All of which is commended to the attention of the mining world as of considerable present interest.

THERE appears to be internal if not intestinal trouble in the affairs of the American Smelting Co., the combine of the American Smelting & Refining Co. and the Guggenheims, concerning which so much has recently appeared herein. On the 10th inst. Mr. Rogers and Mr. Lewisohn, prominent directors of the A. S. & R. Co., wrote their resignations. The meeting of the stockholders of that company to increase the capital stock from $65,000,000 to $100,000,000, for the purpose of absorbing the Guggenheim interests, was called for the 16th inst., but a temporary injunction was secured by those opposed to such absorption, restraining the officers of the company from such increase of the capital stock. The complaint on which the injunction was granted alleges that the Guggenheim property was not worth what the company proposed to pay for it, and that, as the proposed purchase would establish a complete monopoly in the business of smelting and refining gold and silver ores in that part of the country in which such smelters and refineries were operated, the combine would be subjected to all the penalties prescribed by U. S. Statute against such monopoly.

Old Readers and New.

It is usual for frequent inquiry and answer as to something in mining or metallurgy that betokens lack of expert knowledge but sincere desire for exact information on that particular point, and, occasionally, comes a gentle little criticism or remonstrance from some old and valued subscriber regarding the appearance of just that kind of information in some previous issue just to hand, the latter expressing some surprise that this paper should publish what so many miners are already supposed to know, and courteously intimating that there is so much of immediate improvement and knowledge transpiring that it should be unnecessary to publish anything presumably known already.

As between the two, the paper prefers to risk the displeasure of a few older patrons in the interest of the many new, for while the appearance of such primary information may not be necessary to some readers, yet just such points are what attracts great numbers of newer readers, who expect reliable and exact information of value in their daily work, in every department of mining and metallurgy. It has been the pleasure and the privilege of the paper for forty years to chronicle all improvements in mining and metallurgy, and the history of this paper is the history of scientific metal mining in the United States. But many who learned all about those things and told of them in these columns are passing away, or engaging in other pursuits, and, pressing on their footsteps, come a legion of new men who know no more about those things now than those who learned and told of them years ago did when they, too, were beginners; and it continues to be the province and the purpose of the paper, while giving the very latest in all branches of the industry to which it is devoted, to also supply whatever information is asked, no matter how rudimentary it may appear, in the knowledge that it is still thus fulfilling its mission, this conviction being confirmed by the numerous letters constantly received.

Take, for instance, the cyanide process. For years this paper has published the latest and most valuable concerning the practical operation of that process, and the articles so published have been the basis of the great development in gold extraction from low-grade ores susceptible of treatment by that process. A little item from an El Oro, Mexico, correspondent, in last week's issue, illustrates one phase of such growth, in stating that in that one district are now being treated 20,000 tons of ore monthly by the cyanide process. Probably the men who are treating that ore first learned of its applicability thereto by expert articles that have appeared in this paper, and it is of equal probability that, while they would gladly welcome the latest and newest development in the cyanide process, yet they might now, with some degree of impatience, read some article in this paper explanatory of this process, cost, details, applicability to certain ores, inapplicability to other ores, etc., that they learned years ago and know all about now, yet, being the very thing that some tyro with a mine and money to spend and earnest desire to learn, wants to find out, and naturally asks for information from the best obtainable source. Of course, were this paper or any other paper to merely publish such details already known to many, though of coming interest to many more, it would not be of material value to the adept or proficient. But in addition to such occasional references are also published weekly expert information from those who know all about it. Indeed, it is believed there is no paper in the United States that yearly publishes more original matter, written by the very men who are doing the things that they write about.

This is in kindly answer to the friendly suggestions mentioned, and its propriety will probably be conceded. The men who are only beginners to-day will be in time the equals, we hope, in proficiency of those in present practice. Meanwhile those men have money to buy machinery and appliances, they want to employ men, develop mining property, and are really the hope and stay of the future mining industry; they represent the coming men—some of them arriving, others having their attention turned to the importance of the great basic industry of the nation, the future it affords and the opportunities for advancement and profit, and in a few years they will be the majority.

Tardy But Effectual.

The U. S. Circuit Court of Appeals at San Francisco has done some justice to the mining industry by sending one A. McKenzie to jail for one year and by censuring his colleague in Alaska who disgraces the court in which he acts as judge. The facts are well known to every miner. Rich placer gold deposits were discovered at Cape Nome, Alaska, in 1899, and upon opening of navigation in 1900, nearly 30,000 people rushed there. The territory of Alaska was divided into two judicial districts and Arthur Noyes, of Minneapolis, Minn., was appointed as District Judge for the northern district, which included Cape Nome. With him went A. McKenzie, of North Dakota. It was a great opportunity for a weak judge and a corrupt ally, far from ordinary reach, with the power of the United States behind them in a new country rich and remote. The unsettled conditions made it possible to use the machinery of the law to wreak wholesale injustice and despoil miners of their rights. The procedure was simple but effective. Immediately when a claim was shown to have worth some satellite of the court's perjured himself by setting up title to it, and another of the gang, an "attorney," would go before Judge Noyes and ask for the appointment of a receiver pending litigation as to ownership. Judge Noyes promptly appointed his friend McKenzie, and the rest was easy. The real owner, the miner who had bought and developed the claim, was dispossessed "by law," and his claim worked continuously, day and night, so that the last ounce of gold could be taken out before Nemesis overtook them in the shape of legal injunction from San Francisco. When such injunction did arrive, it is asserted that Judge Noyes found it convenient to remain unseen or at least unfound for five days, during which time McKenzie "cleaned up" the gold contents of the claims he had clutched with even more than ordinary vigor.

Meanwhile, as is their wont, the miners were law-abiding, and though sorely tried patiently awated redress. They would have been justified in summarily ridding themselves of such vultures, but with commendable patience waited to the end. The end was that two United States Marshals came to Nome, and carried McKenzie in custody to San Francisco, where his attorneys fought through every quibble and trick of technicality with the result that McKenzie was sent to jail and his "Honor" the judge severely scored by the Court of Appeals. At present no actual punishment by incarceration has been accorded him, but probably some measure of disgrace attaches by his consciousness of his own identity, as he can hardly help a feeling of contempt for himself.

Meanwhile there will be protection in the future for the miner in Alaska, and thieves in and out of courts have everywhere been taught a salutary lesson.

THE recent ruling of Commissioner Herman of the U. S. General Land Office in the case of the California land "scrippers" was in accordance with justice, in favor of bona fide petroleum miners. But California oil men can not rest in security; for, though the General Land Office has ruled that the miner who has located an oil claim in California, and who has satisfactorily proved the mineral character of the land, can hold it against any "scripper" who pretends that it is agricultural, yet such ruling is not final. The matter comes up for adjudication before Secretary of the Interior Hitchcock on the 13th prox.; and, as that official has already shown his leanings toward the side of the "scripper," it is necessary for the oil men to furnish such showing as will make proper representation of their case. It is now before the Assistant Attorney-General of the United States; and, while he is no doubt an able and impartial gentleman, yet previous rulings from the Interior Department on such matters have indicated more knowledge of the technical letter of the law than of its proper spirit and application. The matter is an important one to California oil interests. The California Petroleum Miners' Association and the California State Miners' Association have just succeeded in defeating a "cinch" bill in the California Legislature, and their prompt, united effort may be equally successful in averting a probable peril at the national capital.

Concentrates.

PROTOGENE is granite in which talc takes the place of mica.

PARAFFINE OIL is considered best for insulating induction coils.

THE chemical name of the acetylene used for lighting purposes is ethine.

THE loss of mercury varies from 15% to 50% in the case of cemented gravels.

A VALID MINING LOCATION may be made by a minor, a woman, a citizen or a corporation.

GOLD is absorbed by new copper plates at an approximate rate of half a pennyweight to the ton of ore milled.

THERE is a constant loss of heat in water used for cooling the cylinder of a gas engine, which could be practically utilized.

THEORETICALLY the horse power of 40 miners' inches, 100 feet fall, would be 9.6588; practically it would be from 50% to 80% of that.

IN early California hydraulic practice it was not unusual in sluicing to have as much as 4000 pounds of mercury in use at one time.

A POUND OF ZINC, when cut in shavings such as are used in the cyanide process, would expose from 1500 to 1600 square feet of surface.

THE "Durango Bay" mine, Red Mountain, King county, Wash., is one of the customary swindles, and only deserves notice to be condemned.

SULPHIDE OF GOLD can exist in the colloidal state—i. e., in a condition resembling glue or jelly—and is then soluble in pure or slightly acidulated water.

PLATINUM WIRE is used in the base of incandescent lamps, as it is the only metal which expands and contracts with heat at the same rate as the glass.

NO ONE can exclusively appropriate to his own benefit a geographical term so as to prevent others inhabiting the same or similar territory from dealing in similar articles.

AURIC CHLORIDE warmed by an alkaline solution of peroxide of hydrogen is at once reduced to metallic gold. This reaction serves as a means of separating gold from platinum and iridium.

"THE sum of $300,000,000 pure gold," if "in the shape of a ball," would in such globular form represent a sphere a little over 12½ feet in diameter, giving gold a value of $20.671834625 per ounce.

METALLURGY in its more theoretical aspect is the science of extracting metals from their ores. Viewed from a commercial standpoint, it is the science of profitable extraction of money from the ore.

INFUSORIAL EARTH is the standard material for dynamite or "giant powder" manufacture, but wood flour is sometimes used as a cheap substitute. The latter is made by grinding sawdust to a fine powder.

ANEROID BAROMETERS may be used to measure the depth of shafts in mines, provided a number of trips are made and the average taken, the cage, in no instance, to be stopped in transit between surface and bottom.

FOR drill work in hammered steel the atoms are condensed and made of closer texture; rolled steel elongates the particles. The latter costs less, originally. The best is the cheapest in the long run—or the short run.

ANTHRACITE COAL requires for complete combustion eleven pounds air per pound of coal—132 cubic feet air at 60° F.; kerosene requires about eighteen pounds air per pound of oil or 235 cubic feet; gasoline about the same as coal.

WERE the earth to cease rotating the Mississippi would flow toward the north. The southern end of a water level line north of the equator is higher than its northern end, because of the bulging of the sphere at its central line.

TO AVOID the waste of oil in the ordinary oil can, file the end of the oil can spout off at a bevel. One can then slip it under the lids of the journals without touching them with the hands, and the stream of oil can be carefully directed.

IRON and steel are used extensively for "timbering" and other mine use in Europe, where suitable wood is scarce, but, except in rare instances, there is no use of such substitute for ordinary timbers in the metal mines of this country.

ANY mineral lands in any forest reservation which have been or which may be shown to be such, and subject to entry under the existing mining laws of the United States, are subject to such location and entry in the usual manner.

OWNERS of valid mining locations made and held in good faith may fell and remove therefrom any timber growing thereon for actual mining purposes in connection with the particular claim from which such timber is felled or removed.

TO FIND the diameter of the steam pipe for an engine, multiply the square root of the engine horse power by .408; the product will be the diameter of the pipe in inches. Assuming the engine to be 100 H. P.: $\sqrt{100} = 10$; $.408 \times 10 = 4.08$ inches diameter.

WHEN a mining corporation, in good faith, works, by ordinary mining processes, deposits of stone and other mineral on its lands, with a view to utilizing the product for commercial purposes, the land so worked is "mining ground," within the law of California.

IN the use of crushing rolls where fine product is desired, the ore materials delivered to the machine, divided into four sizes, may be estimated, approximately: Passing a 4-mesh screen, 40%; passing a 2-mesh screen, 30%; passing a ½-inch-mesh screen, 2%; larger, 10%.

CONCENTRATION of cinnabar ore is practicable, but not practical, as it would ordinarily cost about as much to concentrate the ore as to treat it direct, just as it comes from the mine. Almost any method of cinnabar ore concentration would cost as much as furnace treatment.

WHAT is believed to be the largest blast furnace for lead smelting is in use at the Pertsuola Works, Italy. It is the Pilz furnace, has a double series of tuyeres, twelve being 30 inches above the furnace bottom and twelve 4 inches higher. The same type of furnace is in use at Freiburg.

ON the Rhine, Volga and other European rivers, and in canals, barges, tugs and boats are hauled up stream by means of a rope or chain laid in the bed of the stream, picked up by the vessel, passed over a revolving winding drum and dropped astern, giving slow but steady progress.

WITH a sluice 1000 feet in length the most of the mercury is to be distributed along the upper 250 feet, the remainder along the next 400 feet. About 500 pounds, with one-fourth of that amount for the undercurrents, would be a fair charge, mercury being added in much smaller quantities.

THE formula for silver solder is: fine silver, nineteen pennyweights; copper wire, one pennyweight; brass wire, two pennyweights; melt in crucible under a coat of powdered charcoal; when melted pour into a bucket of clean water to granulate, then pour into a wooden mould and hammer into a thin sheet.

IT is useless to attempt further information regarding molybdenum; all procurable data has been published and republished in former issues. The supply fully equals the limited demand. If the molybdenite ore carried about 58% or 60% molybdenum, and was free from copper, it might bring $175 per long ton at the mine.

THERE is a large deposit of lepidolite near Pala, San Diego Co., Cal., rich in lithium and potash, and of value in the manufacture of lithium salts, which are used extensively in medicine. The chief source of supply is from Germany, the consumption averaging in this country 50,000 pounds per annum, worth about $4 per pound.

THE necessary diameter of a required pipe can be determined where the volume and velocity of the water are known: multiply the number of cubic feet of water by 144; divide the product by velocity in feet per minute; the quotient is the area; divide this by .7854; the square root of this last quotient is the diameter required.

DURING the last fourteen years California has produced about 10,000 tons of manganese ore, worth about $10 ton. Russia supplies more than half the world's manganese. Chile is also a large producer. The metal is worth wholesale (98%) about $1.10 per pound, New York. "Chemically pure" manganese is worth about $100 per pound.

IN battery screens for gold milling wire screens take their numbers from the meshes to the linear inch; perforated and slotted screens from the needle used in punching them. In gold milling No. 6 to No. 9 perforated and slotted screens have mesh 25, 30, 35 and 40, respectively, their weight in pounds per square foot being, respectively, 1.08, 0.987, 0.918, 0.827.

THAT one of two joint locators of a mining claim is not a citizen of the United States, but the other is, does not invalidate the location, and a joint conveyance by them vests a valid title in the grantee. A recital in the location notice of a mining claim that it is the relocation of another mining claim is an implied admission of the validity of the former location.

UNDER the laws of California a stockholder of a corporation is individually liable to each creditor of the company in the amount determined by such a part of each claim as each stockholder's stock is a part of the stock of the company. An action may be brought against any stockholder in the courts of any State where service may be had to recover the amount due the creditor.

EXPERIMENTS of Hadfield, Barrett and Brown indicate that steel containing nickel 25.00, manganese 5.05, carbon 0.60 has the highest resistivity of any commercial metallic conductor yet produced, being equal to 97.52 microhms per cubic centimeter at 15° C., giving to the alloy a resistivity sixty times greater than that of pure copper, ten times that of iron and four and five-tenth times that of German silver.

BY the "life of a mine" is ordinarily understood how long its active working or development will result in any net profit. Many factors enter into the problem: the amount of the mine's ore contents; the rate of ore treatment (including capacity of mill); the manner of working, demand for dividends, etc. The "life" of an unproductive or unprofitable mine depends on the faith or financial ability of its owners.

ONE LOCATION of 160 acres placer ground is sufficient, but there must be a mineral discovery on each twenty acres thereof. This, however, applies only to an association of eight persons. An individual locator can not enter more than twenty acres in any one placer claim or location. Work on a ditch or canal can be applied to the assessment work for the common benefit or development of contiguous claims held in common, if sufficient in amount to equal such required expenditure upon all the claims.

MATTE SMELTING is a species of concentration, and comes under the general head of ore dressing. Wet concentration is almost entirely based on the difference in specific gravity between metal-carrying minerals and waste material. There may be in the same ore material with 2½ specific gravity; galena, 7½ to 8 specific gravity; iron and copper pyrites, 4½ to 5 specific gravity, and other metals lighter and heavier. This difference is affected and adjusted by wet concentration.

A MIXTURE to imitate marble and take a fine finish may be made by reducing marble dust or white crystallized limestone to a very fine powder by grinding and sifting and intimately mixing one-fourth its weight of zinc oxide (zinc white) and one-eighth its weight of Portland cement, mixing thoroughly into a thick paste with a 40% aqueous solution of hot water glass. By moulding the paste under pressure and exposing the moulded form to warm, dry air for a week it can be polished.

A good petroleum joint with common iron pipes can be secured by heating both the male and female threads sufficiently to dissipate every trace of oil and then make the joint up with thick shellac varnish, which may be combined with ordinary dry vermilion or even Venetian red. A good joint can also be made with ordinary yellow bar soap rubbed into the threads of the pipe, the grease first being removed. Treacle, honey, glue, mucilage and glycerine are also petroleum-proof. For a stuffing box, ordinary wicking saturated with common yellow bar soap may be safely employed.

IRON PIPE expands at the rate of .00000648 of a foot for 1° F., and for 1 foot in length. If the pipe is put up at a temperature of 60° F., and the highest pressure of steam to be carried is 100 pounds by the gauge, then an allowance for expansion is to be made accordingly: the difference in temperature between that at which the pipe is put up and that due to steam at 100 pounds pressure is $338 - 60 = 278°$. For 1 foot in length, the expansion being .00000648 of a foot, for 100 feet it would be $.00000648 \times 100 = .000648$ of a foot for 1°, and for 278° $.000648 \times 278 = .18$ of a foot, or $2\frac{3}{16}$ inches.

THERE is now available for the work of restraining barriers in the Yuba river, California, the sum of $650,000; $250,000 of this was appropriated by the Federal Government and $400,000 by the State; $150,000 of the latter was appropriated last week and will be available when required. It is understood that the California Debris Commission will immediately begin the work, and that Congress will make additional joint appropriation of $150,000 at this session or the next one, making the total of $800,000 estimated to be required by the U. S. engineers for the successful completion of the work.

CANVAS, saturated with shellac varnish, makes a good washer, but soft metallic washers are better. A good flexible diaphragm for a regulator may be made of closely woven cotton fabric, varnished on both sides with a compound of gelatine and glycerine; about equal parts by weight make a tough and elastic compound. Wooden vessels and bags may be made petroleum-tight by saturating or varnishing with this compound. As a rule, all substances which are soluble in water are insoluble in petroleum. For stuffing boxes for standing both water and petroleum, castor oil is recommended, as this peculiar oil seems insoluble in either.

SOME American lubricating oil for machinery has a specific gravity of 0.92, a flash point of 206, a viscosity (water = 1 at 0° C.) at 80°, 4.23; at 100°, 1.65; for steam engine cylinders, specific gravity 0.886, flash point 283, viscosity at 100°, 4.17; at 150°, 1.78. Russian oil for lubricating engines has specific gravity 0.909, flash point 197, viscosity at 80°, 6.28; at 100°, 1.76; for cylinders, specific gravity 0.916, flash point 215, viscosity at 80°, 11.65; at 100°, 2.21; at 150°, 1.42; for general purposes, specific gravity 0.908, flash point 138, viscosity at 80°, 8.84; at 100°, 2.05. German lubricating oils for machinery, specific gravity about 0.928, flash point 1.55 viscosity at 50°, 15.48; at 100°, 2.69; for general purposes, specific gravity between 0.910 and 0.994, flash point between 162 and 135, viscosity at 50°, 3.84 and 3.17, respectively; at 100°, 1.63 and 1.40, respectively.

THE inch is equivalent to 2.54 centimeters; the foot to 30.48 centimeters; the yard to 94.44 centimeters; the mile to 1609.33 meters; the nautical mile to 1852.30 meters. The square inch is equivalent to 16.387 cubic centimeters; the cubic foot to 28,516 cubic decimeters; the cubic yard to 764,535 cubic decimeters; the pint to 0.567 cubic decimeter; the gallon to 45.410 cubic decimeters. The grain is equivalent to 64.799 milligrams; the ounce avoirdupois to 28.349 grams; the pound to 453,590 grams; the ton to 1016.050 kilograms. The foot pound is equivalent to 0.13825 kilogrammeter; the French horse power to 75 kilogrammeters a second; the English horse power (550 foot pounds a second or 33,000 foot pounds a minute) to 76 kilogrammeters a second. The metrical unit of pressure is the kilogram per square centimeter. We may also count by centimeters of mercury or by atmospheres. A pressure of one atmosphere corresponds to a column of mercury 76 centimeters high, or to 1.033 kilograms per square centimeter. The pound per square inch corresponds with 70.3 grams per square centimeter.

Power Required by Stamps.

Written for the MINING AND SCIENTIFIC PRESS by A. W. WARWICK.

The power consumed by a stamp battery is a matter about which we know too little. It seems as if, after fifty years of use, we should be able to take the design and calculate, with some degree of accuracy, the power required to operate the mill. An examination, however, of the numerous text-books, manuals and pamphlets on stamp milling fails to disclose any adequate formulæ for the calculation of the power required by a stamp. Take, for example, that admirable little pamphlet by Preston on "California Gold Mill Practices:" On page 32 the power required for 850-pound stamps, drop 6 inches, 95 times per minute, is given as 1.33 H. P. After examination of over 100 diagrams, taken from various stamp-mill engines, the writer can say with assurance that 1.33 H. P. is at least 50% too low for the stamps quoted.

Henry Louis, in his "Handbook of Gold Milling," is the only writer who has endeavored to work out mathematically the power required by a stamp. He has given formulæ for finding (1) the friction of cam shaft in its bearings, (2) friction between cam and tappets, (3) friction of stem in guide and (4) dead lift of stamp, the sum of the powers required to overcome these resistances being the power required to lift the stamps. In applying these formulæ, however, the present writer has found a serious discrepancy between the actual power, as found by indicator diagrams, and the calculated power. Thus, in a 10-stamp mill, the following results were obtained:

Actual power per stamp 850 lbs., 6 in. drop, 90 per min	1.785
Calculated power per stamp 850 lbs., 6 in. drop, 90 per min	1.393
Error	0.392

An error of nearly 30% in the calculated power is far too great to be due to accidental causes; such an error should not be tolerated in good engineering practice. It seems, therefore, that there must be either some error in the determination of the H. P. by the engine indicator, or that there is something wrong with the Louis formulæ. The actual power given is the average of a great many determinations, all of which agree within the ordinary limits. Moreover, the power given agrees with numerous other power determinations of other stamps. On the other hand, careful examination of the mathematical processes followed by Louis fails to discover any error. It is clear, therefore, that some factor exists which has a disturbing influence, and which was overlooked by Louis.

The formulæ for calculating the power required by a stamp may be given in the following simplified form:

$$\text{Friction of cam shaft} = \frac{\text{wt. on shaft} \times \text{diam.}}{2 \times 90} \qquad (1)$$

Friction between cam and tappet = length cam curve in ft. × wt. stamp × coef. friction. (2)

Friction between stem and guide = horiz. thrust due to cam × drop of stamp × coef. friction. (3)

$$\text{Dead lift of stamp} = \frac{\text{wt. stamp} \times \text{drop in inches.}}{12} \qquad (4)$$

These formulæ give the foot-pounds absorbed, or required, for one drop of the stamp.

Horse power required per stamp head =

$$\frac{\text{sum of formulæ } 1, 2, 3, 4 \times \text{no. drops per min.}}{33{,}000} \qquad (5)$$

Applying these formulæ to the stamps, above considered, the following results were obtained:

	F. P. per drop.	H. P.
Friction on cam shaft	22.00	0.060
Friction on cam and tappet	62.33	0.170
Friction on guide and stem	1.83	0.005
Dead lift	425.00	1.158
Totals	511.16	1.393

The result is, as we have seen, much too low.

A consideration of the properties of the orthodox cam curve—an involute to a circle—will show that the uniform rotation of the cam shaft gives a uniform upward motion to the stamp. Now, when the cam engages the tappet, the latter being at rest, inertia comes into play and the tappet can not instantaneously move at the instant of engagement. The result is that the tappet must have a pressure against the cam greatly in excess of the dead weight of the stamp. This is perfectly clear. The point is now, can this pressure be measured? This is fortunately the case both by calculation and actual measurement. As we are calculating the power strictly from the point of view of the battery design, we will here only consider the calculation, leaving the demonstration till further on.

If we consider that at the moment of release of tappet and cam the former has an upward motion, we see that inertia again comes into play and the stamp will continue to move upward until its energy is spent against the action of gravity. This terminal inertia, the effect of which can be readily calculated, must be strictly comparable to the initial inertia against starting—neglecting friction of guides, etc., which is extremely small.

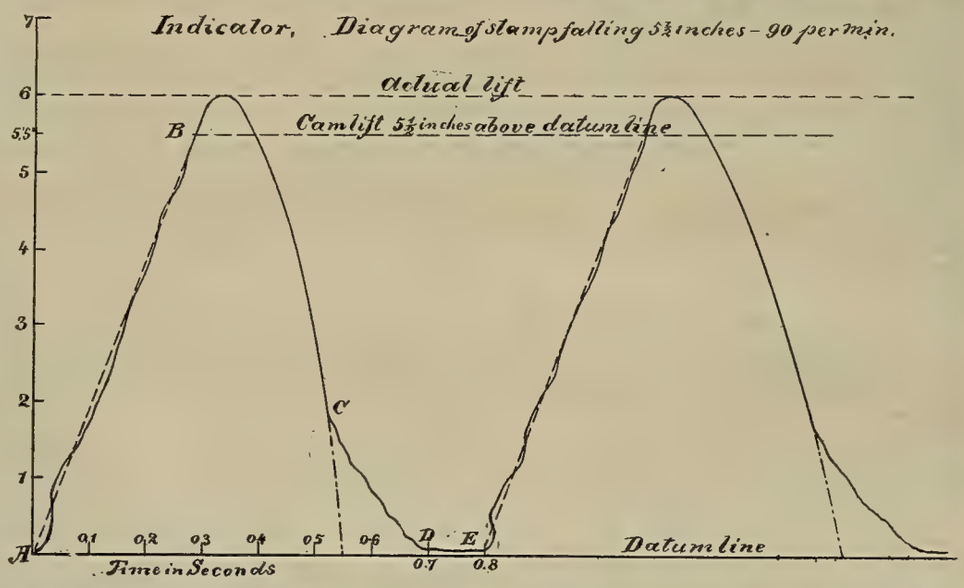
Examination of the mill drawings gives us all the data required to calculate the upward velocity of the tappet as it leaves the cam. From this we can readily calculate the distance it will be thrown. The formula for the time occupied in the lift of the tappet is $\frac{H}{\pi r} \times \frac{60}{N}$ (6) where H = lift in feet, π = 3.1416, r = distance between centers of cam shaft and stem, N = number of drops per minute. In the case under consideration H = 6, r = 6, N = 90, and the time occupied in the lift was 0.212 second. The height of the lift being 6 inches, the velocity is, therefore, 2.35 feet per second. The tappet will rise, after leaving the cam, a distance of $\frac{v^2}{2g} = \frac{2.35^2}{64.4} = 0.0857$ foot, or 1.028 inches; the total lift becomes 7.028 inches.

It is obvious that a cam adjusted to a 6-inch lift will actually raise the stamp (850 pounds) 7.028 inches. It will also be obvious that the cam does the whole work during its 6-inch lift; therefore, calling W the weight of the stamp, H the actual height to which it is lifted, w the pressure against the cam, h the height during which the cam works (or is in contact with the tappet), then

$$w \times h = W \times H, \text{ or } w = \frac{W \times H}{h} \qquad (7)$$

Applying this to our stamp calculations, we have $w = \frac{850 \times 7.028}{6} = 995$ pounds. We thus see that the dead weight of 850 pounds gives an actual live weight on the cams of 995 pounds, and this latter figure should be used in calculating mill proportions, power required, etc., instead of 850 pounds per stamp.

The writer believes that this factor of inertia is the one overlooked by Louis. The effect of inertia interpolated into the formulæ 1, 2, 3, 4 will, or should, give us a very close approximation to the actual horse power required by a given stamp of a certain design. The calculations are given somewhat in detail, replacing the weight of the stamp (850 pounds) by our calculated pressure against the cams (995 pounds).



FRICTION IN CAM SHAFT BEARINGS.—The weight on the cam shaft is made up of (1) number of stamps supported simultaneously; (2) weight of cams; (3) weight of bullwheel; (4) pull of belt; (5) weight of cam shaft. The number of stamps supported simultaneously is obtained from the formula $\frac{h\,s}{\pi r}$, where h = lift, s = number of stamps on shaft, π = 3.1416, r = distance center to center of cam shaft and stems. The number of stamps supported simultaneously in the case under consideration was 2.7. The diameter of the shaft is 5½ inches.

	Pounds.
2.7 stamps at 995 pounds	2686
Weight of cam shaft	1250
Weight of bullwheel	2250
Weight of cams	1560
Pull of belt (approximate)	850
Total weight on bearings	8596

Then $\frac{8596 \times 5\frac{1}{2}}{2 \times 90} = 244.7$ f. p. per drop = 0.667 H. P. per minute for ten stamps; proportion for one stamp, = 0.0667 H. P.

FRICTION BETWEEN CAM AND TAPPET.—The length of the cam curve, where it cannot be measured, can be calculated from the formula $\frac{2\,Kh + h^2}{2\,r}$, where K = height from center of cam shaft to point of engagement of cam and tappet, h = height of cam lift, r = distance from center to center of cam shaft and stem; coefficient of friction by actual measurement is 0.119. In the present case the length of cam curve is 10¾ inches, by measurement. Then we have from formula (2) $\frac{10.75}{12} \times 995 \times 0.119 = 106$ f. p. per drop, = 0.2890 H. P. per minute.

FRICTION BETWEEN STEM AND GUIDE.—There should be no friction in guides except that caused by side thrust of the cam, due to the latter working at one side of the center line of the stem. This side thrust is found by the formula sin. angle × pressure of stamp on cam. The angle is very small, not more than 2°; the value of the sine of 2° is $\frac{1}{30}$. The side thrust is, therefore, $\frac{995}{30} = 33.2$ pounds. The friction of the guides only acts against the engine during the time the tappet is on the cam, or through 6 inches. The friction in each guide is, according to formula (3), $33.2 \times \frac{6}{12} \times 0.119 = 1.97$ f. p. per drop.

There are, however, two guides, and the friction is practically the same in each; therefore, the total loss in power is 3.94 f. p. per drop, or 0.0107 H. P. (Louis has only calculated the friction lost in one guide. This must surely be an oversight, because there can be no doubt as to the point that power is lost by friction in each guide, and to practically an equal extent).

DEAD LIFT.—The cam actually forces up the stamp to a height of 7.028 inches, instead of the 6 inches at which it is set. The stamp must derive the power to do this from the cam, and therefore the dead lift should be calcualted from 850 pounds × 7.028 inches, or 995 pounds × 6 inches, the result being the same in each case. The dead lift is $\frac{995 \times 6}{12} = 496.6$ f. p. per drop, or 1.3543 H. P. per minute.

Assembling these results and comparing them with the calculations from the uncorrected formulæ, the total power required by the stamps under consideration is:

	Corrected H. P.	Uncorrected H. P.
Friction of cam shaft	0.0667	0.060
Friction of cam and tappet	0.2890	0.170
Friction of stem and guides	0.0107	0.005
Dead lift	1.3543	1.158
Totals	1.7407	1.393
Actual power used	1.785	1.785
Difference between actual and calculated	0.0443	0.392

By the use of these corrections we see that the calculated power is within 2½% of the actual power as found by the indicator. It would be difficult to say which result was the more correct, inasmuch as the indicator itself is not free from error.

These calculations have a practical bearing, in that they allow the mill designer to compute the power required to operate his mill with very considerable accuracy. Another useful application is that they show the frictions to be no negligible portion of the power required to operate the stamp battery; let a millwright compute the friction losses that would be made if he did not absolutely set the stems, cams, etc., as required by the design, and it is safe to say that he would be astonished at the enormous losses of power he would make, to say nothing of the increased wear and tear. The stamp battery can not be too carefully adjusted. The calculations further show that the losses due to inertia are quite important; at first sight, this naturally suggests the question whether a better cam could not be found than the involute to a circle. On this point the writer thinks that cam curve, as generally adopted, can not be improved up.

It was promised above that proof would be given of the fact that the stamp continues to rise after

leaving the cam. In a highly interesting paper written by Louis (Trans. Am. Inst. Mining Eng., Vol. 28, p. 355), an account is given of an instrument capable of analyzing the action of the stamp stem. A diagram is obtained resembling the steam engine indicator diagram, but the former does not give the power diagram—only an autograph of the movements of the stem. The figure given shows the character of the diagram obtained. The horizontal line shows the datum line to which stamp falls. At A the cam engages the tappet and the wavy line at this point appears in every diagram; calculations made from this phenomenon, which is assumed to be caused by inertia, show that the cam strikes the tappet with a blow of about 1700 pounds, acting through a time of about 0.03 second; the space through which the tappet rises in that time is about ¼-inch. From the well-known formula $F = \frac{Wv}{gt}$ we can readily figure the blow. Once the tappet reaches constant velocity, the pressure falls to the normal weight of the stamp, 850 pounds.

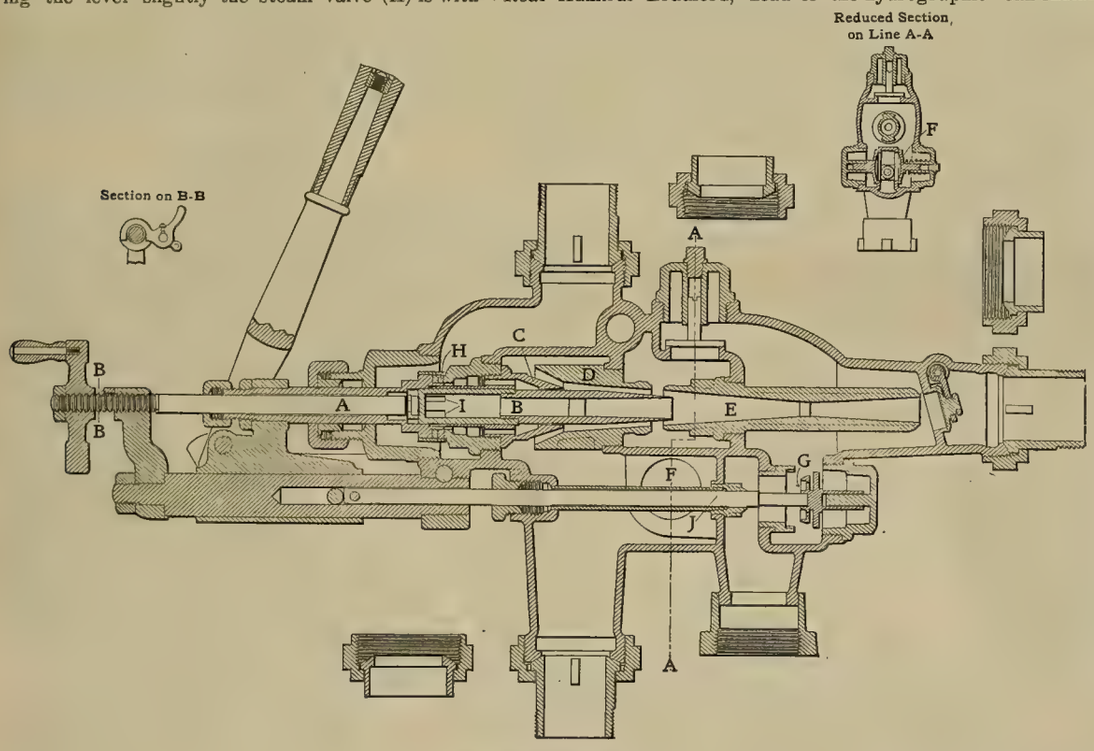
Then $\frac{1700 \times \frac{1}{4} + 850 \times 5\frac{1}{4}}{6}$ = average pressure on cam, about 990 pounds, thus confirming our purely mathematical considerations. At the point B in diagram the cam and tappet disengage, but the tappet still continues its upward course till its energy is spent. At C the falling stamp comes in contact with the ore, between shoe and die, and does its work. At D the stamp has come to rest, where it remains for about one-tenth second. At E the cam re-engages the tappet and the cycle is repeated. The dotted line shows the theoretical line of the diagram. In the diagram the length of drop given was 5½ inches, but the actual height to which the tappet was lifted was from 5¾ to 6 inches, thus proving the point that the stem does rise after leaving the cam. For a 6-inch drop the average of twenty diagrams showed that the lift was from 6 7/16 to 6 15/16 inches, an average of about 6⅞ inches—or, more accurately, 6.92 inches. The difference between the calculated lift and the actual lift (7.028—6.92) is 0.108 inch, which is due to the friction of guides and vibration. Still, the power given to the stamp is sufficient to raise it 7.028 inches, were there no friction, and this latter figure should be used in calculation, and not 6.92 inches. The results check up so closely all round that the writer is quite convinced that the inertia factor, not being taken into account, has been the cause of the discrepancy between the calculated power and the actual power required by the stamp head.

The Lunkenheimer Injector.

Herewith is shown a sectional view of the new injector which the Lunkenheimer Co. of Cincinnati, Ohio, have placed upon the market.

Referring to the cut, it will be noted that by pulling the lever slightly the steam valve (H) is withdrawn from its seat and steam is admitted to the lifting steam jet (C), through the annular space around the movable steam tube (B). Steam flowing into the water lifting tube (B) forms a vacuum in the water supply pipe and the water is "lifted" and passes out through check valve (A), also delivery tube (E), past the overflow valve (G) to the atmosphere. Drawing the handle further back opens the ports (I—I) in movable steam tube (B), thus admitting steam to the interior of said tube, which forces the water through combining tube (E) past line check to boiler, due to the closing of overflow valve (G), occasioned by withdrawal of rod (J). The principal feature in this machine is that the regulation of the water is accomplished by the movement of the movable steam tube (B), the amount of which is controlled by the crank handle at the end of the machine. On this account it differs from other forms of injectors, inasmuch as, in cutting down the discharge of water, the steam consumption is reduced in direct proportion. In other forms of injectors the steam supply remains constant, while the water supply alone is reduced.

The manufacturers claim for the injector that it will start promptly under most conditions and can be depended upon to work reliably at all steam pressures from 25 to 300 pounds, and higher. They further claim that it is distinctively a high pressure injector, designed particularly for that service, and that, being self-adjusting—that is to say, it is not affected by variations of steam pressure, even within great limits, and when started, for instance, at 70 pounds—it can be relied upon to work uninterruptedly to 300 pounds, and that a sudden reduction in pressure would not disturb its action. The manufacturers will be pleased to send a complete descriptive circular upon application.



The Lunkenheimer Injector.

A New Hampshire Mica Mine.*

To THE EDITOR:—I send you herewith two pictures of the Newfound Mica Mining Co.—one showing the gang in the shaft and the other the workshop and hands after lunch. Our main shaft is about 70 feet deep, and we are now commencing to drive tunnels to the north and south. We get from 1000 to 1500 pounds fine ruby mica at a shot. This mica cuts about 6% into sizes from 1½x4 inches up, and the average is rather above 3x3 inches, considerable as large as 6x8 inches; so that our product brings a good price. Then we find a ready sale for our waste and small-pattern mica. Our mine is located in the main mica lode, which courses from Keene, N. H., to the main State line, and is situated in the town of Alexandria, Grafton county, N. H. I have found and bonded two good prospects—and good ones are scarce. I have one that is a fine vein of smoky quartz and feldspar, with a good exposure of large mica and a fine amount of beryl; this vein is from 60 to 70 feet wide, while the one I am now working is scarcely 20 feet wide. CHAS. F. RICE.

Bristol, N. H.

* See illustrations front page.

THE survey of the ocean bottom for the cable to Japan and the Philippines has been completed and Rear Admiral Bradford, head of the hydrographic bureau, announces his readiness to proceed with the laying of the cable. About 60 miles east of the island of Guam an abyss was encountered, the deepest ever found, in which bottom was only reached when 31,614 feet of wire had been run out. This abyss, now named the Nero deep, is, of course, avoided. At another place a high mountain range was discovered, through which it was necessary to find a pass.

Mining in Korea.

Written for the MINING AND SCIENTIFIC PRESS by W. G ANDERSON JR.

I have spent fourteen months in the Wunsan mines of Korea. It is interesting to note how mining has been carried on by the natives for hundreds of years. The most extensive mining is done by the Oriental Con. M. Co., an American company, who have a large concession—25 square miles—of valuable mining land. They have three modern stamp mills running, two 20-stamp mills and a 40-stamp mill. This concession has only been opened up in the last four years, so it is evident that there is no great drawback to mining in Korea. Large mortars and boilers have been taken to the mines with less trouble than in some cases on our mother lode. Transportation is very cheap. The coast junks carry freight up the Yellow sea and go up the rivers. I have seen a bull cart carry 1600 pounds, and sometimes it takes four mules to haul that much on our California mountain roads.

The Wunsan mines are in the northwestern part of Korea, near the line of Manchuria, China. The whole of Korea is a mining country. The Koreans have been working their mines for hundreds of years. They work down till the water drives them out. They have no pumps and cannot get much deeper than the base of the mountains. Having no powder, they build fires on the quartz and then throw water on the hot rock, causing it to crack. They gad out as much as possible and then pass it to the surface in baskets, throwing the baskets of ore from one man to another. They then carry the ore to their mill, a large, flat rock, with a half-rounded rock on top, with two poles lashed across it for handles.

Two men, one at each end, rock this rounded stone, while another feeds the ore onto the flat rock. When it is ground fine enough it is placed in a heap and panned out. A Korean pan is sometimes a pumpkin shell. The sulphurets are rubbed between two stones and sometimes roasted. On some of these mines over 1000 Koreans are making their living. When a foreigner gets a concession he has these miners driven off, so prospecting in Korea is easy.

The ore is high grade on the surface. Most of the mines are in granite. I have seen a shoot of ore 800 feet in length, 400 feet deep and in some places 14 feet wide. There are also ledges in slate. The natives told me that there are richer mines on the northeast coast. The Chinese say that Manchuria is very rich. Men with money can get concessions, but it is no country for prospectors and the poor natives. The miners get 25 cents per day, car men 20 cents, top hands 15 cents and engineers 30 cents. They make good miners and are faithful.

It costs a Korean all he makes to live. He is a good fellow, like our miners. They differ from the Chinese—have better habits and look like an American Indian and are always happy, always singing at their work. When they don't do their work right they get a slap or a kick. In most cases it is the boss' fault on account of his not knowing their language. A man going into the mines of Korea must not think he is going to have much pleasure. He will often wish for a well-cooked meal. There is always pestilence of some kind in the country. Smallpox is always prevalent, men going around with the sores just healing.

The mines are easily kept up; stull timbering is all that is necessary. The walls being good, the mines are not very wet. The ore is rich from the surface, miners' wages cheap and transportation cost not great. In Korea and northern China ore can be mined cheaper than in any other country in the world. There is a fine opening for capitalists, but not for prospectors.

The natives do not know how to use firearms, for they have none. They were a warlike people many hundred years ago. Their cities are all walled and show great military skill at the time of construction. Now they are most peaceable and take readily to American customs and are quick to learn. Of all Asiatics, the Korean seems to me to be the best. The country is little known, but in a few years its great mineral wealth will open it up.

Near Pyeng an English company is operating rich gold mines on a large scale. A Japanese company also has a valuable concession. There are copper mines on the east coast.

Jackson, Cal.

THERE is hardly an operation which takes place, in the process of which electricity is not generated in some form or other. A belt running over a pulley—say, driving a dynamo or any other machine—generates electricity as well as heat and sound. In dry and dusty factories, as is well known, sparks of considerable magnitude may often be taken either from the pulley or the belt. All this reduces the efficiency of the transmission, or distribution plant. Every flap of the belt, every unit of electric-

ity, every unit of heat, and every unit of sound generated by a moving belt has to be provided by the driving apparatus, over and above the energy required to drive the machine it is turning, whatever that may be; therefore everything that can be done to reduce these generations, these losses as they are with reference to the work in hand, increases the efficiency of the plant and reduces the fuel bill and other working costs.

Buffalo Hump, Idaho.

Written for the MINING AND SCIENTIFIC PRESS.

The region lying west of the Bitter Root range, which forms the present boundary between Montana and Idaho and stretches from the watersheds of the Salmon river northward to the Cœur d'Alene mountains, was the scene in the early months of 1861 of the first and greatest gold excitement in the Northwestern country. The stampede has had no rival in the history of mining since the days of '49 (in California), and in some sections even the experience of the argonauts was surpassed. Fortunes were washed out in a single season, and the old Idaho camps of Pierce City, Oro Fino, Florence, Elk City, Dixie and Warrens have produced hundreds of millions in placer gold. The country is drained by the Clearwater and Salmon rivers, and is a wilderness covering an area of 10,000 square miles of high, craggy mountains, flat plateaus, low-lying meadows and deep gorges.

Buffalo Hump rises as a great sentinel, resembling the hump of a buffalo; it can be seen for a distance of 150 miles and forms the dividing hog-back of the watersheds of the Salmon and Clearwater rivers.

The discovery of gold in the Big Buffalo district was made in August, 1898; a rush ensued and by the time snow fell there were 200 locations. The first discovery was made on the east slope of Buffalo Hump mountain, 1000 feet below its summit, and subsequent explorations have proven that the Big Buffalo claim is on the west vein of the mineral belt and midway between its north and south terminations.

The rocks of the district are metamorphic and igneous and are composed of schists, gneiss, coarse-grained granular marbles, coarse hornblende and a mixture of hornblende. Iron, garnet and epidote are found in stringers and irregular lenses. Through these rocks the granite, which forms enormous areas, sent a maze of intersecting dikes and fragments of older rock in great abundance as medium grained. The mineral belt is 2 miles wide and of unknown length. The veins, of which there are four, strike north and south, cutting the granites and metamorphics and dipping east. Over 900 claims were located in this belt previous to January 1, 1900. The attraction to parties for the first time visiting this section is its surface showing—a continuous outcrop all over the Buffalo Hump district, and many of the leads show good assays. The showing on the Big Buffalo, St. Louis, Mother Lode No. 2, Jumbo, Fortune, Vesuvius, Spokane, Monte Cristo, San Francisco and several others on the line of "Mineral hill" promises a future for Buffalo Hump equal to the camps of Rossland and Leadville.

The Big Buffalo ledge is opened by a shaft 200 feet deep, with three crosscuts and a drift 150 feet north and south. The ledge is from 6 to 30 feet wide, and its value right through averages $8.50. The St. Louis shows a face of 5 feet of ore averaging $75. The Mother Lode No. 2 shows 22 feet of ledge, 15 feet of which sampled $12.60. The Jumbo has 5 feet of $20 ore, and nearly every developed vein upon the line of these claims can show improvement at depth. The mill runs on the Big Buffalo ore, taken merely for testing purposes with an ordinary free-milling gold plant, stamps and copper plates, saves 94% of the assay values. The tailings carry only 60 cents to the ton. The concentrates are handled by Wilfley tables and long canvas plant (as is in familiar use in California). The Vesuvius concentrates carry $140 to the ton and the cost of carriage and treatment at the smelters will be $35. The Big Buffalo concentrates run $56 in gold, $15 in silver and slight values in copper and lead.

Buffalo Hump camp is eighteen months old. To reach it trails were hewn into the wilderness. Today it has three towns, two postoffices, general stores, hotels and several hundred workmen, besides the finest road in Idaho county connects it with one of the most fertile prairies on the continent. The Northern Pacific Railroad has pushed into Stuart and has surveys almost within the borders of the camp.

Thirty-Ounce Ore.

TO THE EDITOR:—A statement in your issue of the 19th inst. in reference to this company's doings is somewhat misleading in one important respect. The 50-stamp mill is running on thirty-ounce silver ore (not twenty ounce) and is likely to continue to do so. The favorable solution of the problem of the successful and economical treatment of the twenty-ounce ore will make valuable large quantities of that grade existing both in the mine and dump.

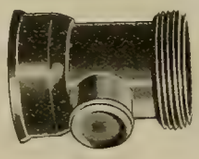
JAS. MONTGOMERY, Gen'l Mgr.

Chinipas, Chihuahua, Mexico, Jan. 31.

Electric Fire Hose Signals.*

Every second of time gained at the beginning of a battle against fire is worth an hour later on. Elimination of delay has been the prime object of recent improvements in methods and apparatus. The electrical alarm gives prompt notice of the outbreak of the fire, and a few seconds after the sounding of the alarm the entire apparatus is rushing toward the scene of operations. On reaching there the hose is reeled off from the carriage in a moment, hydrant couplings are made, and the engineer stands ready to force one or two streams of water into the area of fire. Here the first serious delay is apt to occur. The hosemen drag their empty hose up stairs and then have to send a man back to the engine, or the water is turned on as they enter the building, and they are obliged to drag the hose loaded to a point where they can play. Possibly directions may be shouted, but in the noise and confusion of the street may not be heard, or may be misunderstood, and valuable time lost.

It is to prevent this loss that the electric hose signal has been invented and perfected. By means of this device the man who handles the nozzle is constantly in communication with the engineer. The moment he comes within range of the fire he needs



Nozzle Used Between Play Pipe and Hose, Showing Press Button.

Engine Couplings (2½ in. x 2½ in. and 3 in. x 2½ in.) Equipped for Electricity and Wired to Battery and Bell on Engine.

only to press an electric button on the nozzle point, and the answer will be a full stream of water speeding through the hose as rapidly as steam or natural pressure can send it. Should the flames extend upward, necessitating a change of position, the man at the nozzle signals the engineer to shut off his power and empty the line. This is accomplished in a few seconds. The hosemen with empty hose run up to the next flight, signal again for water, and renew their battle with the fire. Not only valuable time is saved in this way, and at a critical stage in the operation when time is precious, but there is saving in labor.

With a proper code of signals any kind of information can be communicated directly from the play pipe to the engineer. When the fire is subdued, and there is no more need of water, the engineer is notified and the supply is shut off. The electrically equipped hose prevents unnecessary flow of water when the fire is out, and minimizes the liability of bursting the hose by the sudden back pressure caused by the operation of other devices for shutting off the stream.

The equipment consists of a small dry battery and bell on the engine, generally placed under the driver's seat, wired to the engine couplings, which are arranged for electrical conductibility. There are also two nozzles with press buttons, to go between the end of the hose line and the play pipes.

For mills and mines provided with their own fire pumps and fire apparatus the electric hose signal is of value. It is furnished by the National Electric Hose Signal Co., 38 Chardon street, Boston, Mass., and on the Pacific coast by the Bowers Rubber Co., San Francisco.

*See Illustrations Front Page.

A 24-Horse Freight Team.*

The two engravings on the front page furnish a scene familiar to many a miner in this west half of America. They represent a team of twenty-four horses at Sumpter, Baker Co., Oregon, hauling a Sederholm boiler to the Red Boy mine. There are nine span, eighteen horses, in front and three teams hitched to a push pole behind. Probably were the roads better there would not be so many horses required. On good mountain roads there are some great records of freighting. The writer recalls a load weighing fifty-two tons that swung out of Hamilton, White Pine Co., Nevada, in 1870, drawn by twenty-four mules. The photos from which the engravings were made were furnished by Mr. W. B. Kehoe, of Spokane, Wash.

* See illustrations front page.

Report on the Portland, Colo., Mine.

Fred W. Bradley of California examined the Portland mine at Cripple Creek, Colo., last November and December, and makes report thereon from which the following is taken:

"I began the examination November 5th, with the assistance of a crew of fifteen men for cutting samples. This crew was steadily employed in sampling the most important parts of the developed portion of the mine until Jan. 6th, taking in that time 2600 samples.

"I find that the occurrence of veins and values does not differ so much from that or other gold districts I have visited. That is, as is characteristic of all gold districts with which I am familiar, payable values occur in the veins only in the shape of shoots. But your decided advantage in comparison with other districts is the great number of veins and the very high values carried by their shoots of ore.

"The geological conditions do not differ greatly from the Grass Valley district of California, for instance, where gold mining has now been going on for over fifty years, and has reached a depth of about 2000 feet. To be sure, there is there no evidence of a great volcanic vent, but there is a basin of granite overlaid by eruptive rocks. The whole mass is fissured and fractured as at Cripple Creek, and these fissures have formed the channels along which underground waters have circulated and in which they have deposited their valuable gold contents in the shape of ore shoots. The fissures not only extend in every direction, but continue uninterruptedly from the granite into the overlying rock, as they do in the Cripple Creek district. Until recent years, miners of the Grass Valley district were afraid of the granite, thinking that payable values occurred only in the surface rocks; but now some of the richest ore bodies ever found in the district are being worked from the veins in the granite.

"So with the Silver City district, Idaho. A network of veins there continues uninterruptedly from the granite up into the overlying porphyry. Work for years has been conducted in both formations, and mines are working to-day on ore bodies that have been followed from the porphyry down into the granite.

"The above conditions are illustrated in your own property, where good ore bodies occur both in the granite and in the crater-filling breccia. In fact, the Diamond veins seem to be productive only in the granite.

"In the Cripple Creek district the many dikes of basalt, andesite and phonolite indicate such deep-seated fissuring and fracturing, leaving favorable channels for the circulation of mineral-bearing waters, that we can confidently expect to find ore shoots at much greater depths than have yet been penetrated by any underground workings of the district.

"I estimate from an examination of your records, that the Portland property has, up to the 1st inst., shipped 208,894 tons of ore, the gross yield of which has an average of $51.32 per ton. The profits realized from this ore have averaged $25.70 per ton, or about 50%."

Treatment of Slimes.

At an Australian company's works near Croydon slimes estimated at 10,000 tons assay 9 dwt. 11 gr. gold, 20 oz. 17 dwt. silver per ton, the same of mercury, and 2% of acid produced by mineral decomposition. To treat this for a maximum gold extraction and at a minimum expense T. D. Kellaway had slimes delivered at the works by a tram line in one-ton trucks, each truck load being tested for acidity, and then, with the requisite quantity of lime to neutralize this acidity, tipped into a hopper, thence fed into a disintegrator, thence falling to an elevator, which conveys the disintegrated mud to another hopper for distribution to the mixing vats. A screen interposed between the elevator delivery and the hopper prevents scraps of iron, leather, wood and stone from entering the vats and choking the pumps. The mixing vats, four in number, are 18 feet in diameter by 6 feet deep, with a holding capacity of 10,000 gallons, each vat being supplied with a 4-inch centrifugal pump, which runs at a speed equal to giving a pressure of 45 feet head of water. The suction and delivery are both in the vat. The delivery is supplied with a swivel bend, by which the current is directed to any part of the vat, insuring complete agitation of the slimes in the solution. The pulverized and neutralized slimes are fed in a shower directly over the delivery current and carried immediately into suspension. When twelve tons of slimes have been fed into the vat the agitation presently ceases, the slimes are allowed to settle, and the super-clear liquor is conveyed by decanting pipes, which can be lowered or raised at will, to the extractors. When all the liquor has been run off the vat is refilled with a weak solution and the contents reagitated. Another centrifugal pump is then set in motion, which takes the contents of the vat through a system of piping which connects with the bottom of each vat, and delivers it to another vat, where it is again allowed to settle, the clear liquor being again decanted and run through the weak extractors. Suffi-

cient water is now run on the stuff to make up for the strong solution absorbed by the slimes in the first instance. The stuff is agitated a third time, and finally pumped to another vat, where it is once more allowed to settle. The clear water is then decanted and the residues sluiced away.

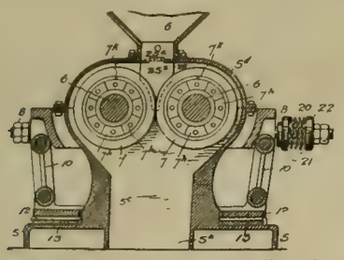
In this manner twenty-four tons of slimes per day are being treated under Mr. Kellaway's supervision. An assay sample is taken from every ton of slimes brought to the works, and a sample also taken from each residue vat. The gold extraction for December, 1900—1148 oz. 15 dwt. bullion from 572 tons slimes—amounted to 86%, the silver being somewhat less. The amount of bullion is stated to have been within 7d. per ton of the month's laboratory extraction assay of £1 13s. 9d. per ton.

Mining and Metallurgical Patents.

Patents Issued February 12, 1901.

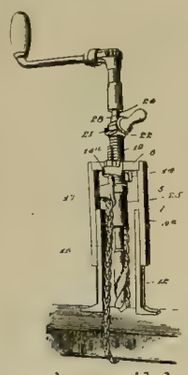
Specially Prepared for the MINING AND SCIENTIFIC PRESS

CRUSHING ROLLS.—No. 667,777; F. M. Iler, Denver, Colo.



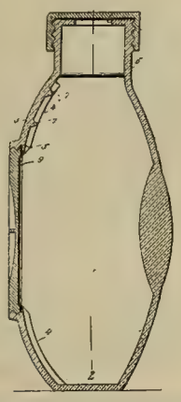
Combination with bedplate, of rolls, pillow blocks in which rolls are journaled, supporting links pivotally connected at upper extremities with pillow blocks, plate with which links are connected at lower extremities, having portion of its under surface curved to conform to arc of circle struck from center of roll, suitable support for plate upon which correspondingly curved faces are formed, suitable means for adjusting plate, comprising set bolts threaded in plate, stationary stops against which inner extremities of bolts bear.

DRILL.—No. 668,137; P. M. Bradley and P. F. Stonehouse, Cripple Creek, Colo.



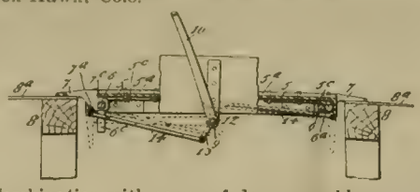
A perforated cross-bar provided with arm projecting from side of center thereof, perforation being screw-threaded, one arm provided with bolt, other depressed and perforated, bolt through perforation, nut of which is above depressed portion thereof, leg detachably secured to each end of cross-bar, chain secured to one arm and to the bolt in the other one, exteriorly screw-threaded sleeve through perforation in bar, upper end with ratchet-wheel, shank through sleeve, lower end adapted to hold drill, upper end adapted to receive means for rotating it, lever pivotally mounted on shank, provided with pawl for engaging ratchet-wheel.

ASSAYING DEVICE. — No. 667,969; A. Campbell, Surf, Cal.



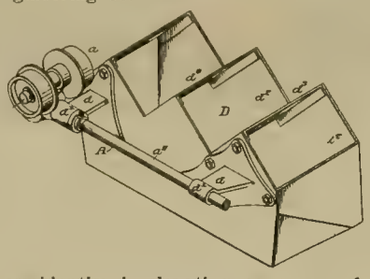
A bottle shaped receiver having oval outlet opening, removable closure for outlet opening, riffles on inner side of one of the walls, magnifying glass in opposite side wall of device, closure for opening in wall having riffles.

SAFETY CAGE CHAIR.—No. 667,780; M. W. Jelinek, Black Hawk, Colo.



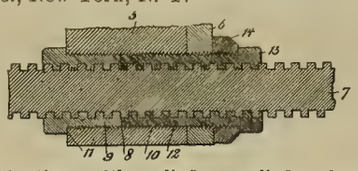
Combination with cage, of dogs movably mounted thereon arranged to support cage at various drifts or levels, dogs when in cage supporting position, lying in plane of cage floor and bottom of drift or tunnel, whereby dogs form guides to facilitate running of car from drift to its position on cage.

ELEVATING AND CONVEYING APPARATUS.—No. 667,975; J. M. Dodge, Philadelphia, Pa., assignor to Link Belt Engineering Co.



The combination in elevating conveyor, of single longitudinal chain, carrying wheels mounted thereon, rails adapted to guide wheels, buckets, each having bearings adapted to encircle single link of chain, wheel on opposite side of bucket from bearings, guiding rails engaging with wheel, curved on elevating run so as to turn bucket from one side of chain to opposite side.

ROCK DRILLING MACHINERY.—No. 667,664; R. L. Ambrose, Tarrytown, N. Y., assignor to the Rand Drill Co., New York, N. Y.



Combination with cylinder, cylinder head and ratchet box having screw-threaded orifice 10 therein, feed screw, of adjustable feed nut 8 having two sections 9 and 12, section 9 fitted to screw-threaded orifice 10, rigidly secured in position by screwing same up to shoulder, adjustable section 12 also mounted in same orifice, having a locking nut 14 for securing it against movement in either direction in such position, relatively to stationary section 9, to which it may have been adjusted.

Diamond Drill Prospecting.

T. R. Beacon gives the results of his experience in prospecting with the diamond drill, saying three different kinds of drills are made, one being hydraulic feed, its thrust produced by hydraulic pressure; one having positive feed, being forced forward a given distance in a given number of turns, which ration may be altered to some extent; and one having spring feed, its thrust being given by a spiral spring, and which may be increased or diminished by tightening or loosening the nut that compresses the spring.

As to the method of applying the drill in prospecting, assuming a showing on the surface that seems to some extent promising and yet where one is not sure whether there is any extent of vein or whether it holds out in depth, but wanting to find out at the least cost of money and in the shortest possible time, in a district or locality where there has been considerable surface disturbance and in a position to be certain of the nature of the deposit. To sink a shaft to a depth of 100 feet would cost $3000, and the time consumed would be four months. If the property turns out good then the shaft is all right, but if not we are out the $3000. With the same amount of money ten holes might have been bored with a diamond drill to the same depth at intervals of say 10 feet apart along the strike of the vein and the vein sampled for a length of 100 feet, and the work done in two and a half months. But as the holes are seldom bored in the plane of the vein the machine placed on the vein at a distance of say 100 feet or so to one side, and the hole bored at such an angle as to cut the vein at a given depth, we have the additional advantage of crosscutting the country for a considerable distance on each side of the vein, and encountering and locating any parallel veins which may exist, or finding our own vein should any slip or fault have occurred in it. In addition we have a clean, neat, continuous sample of ore across our vein from wall to wall at the point where it is cut, and also samples of the wall rock, and from these can be learned a great deal of what we may expect to find when mining is begun. If the ground is seamy and the rock is very schistose the core will be broken up into small pieces, and this would indicate that the ground is leaky and we may have trouble in our mine, consequently when buying our first machinery we will provide sufficient boiler capacity and a pump of good size to handle the water. On the other hand, the core may come out in long, solid pieces and the hole may hold the water from the drill all the way down, and this will be a good indication that we will have a dry shaft. I found this to be the case in sinking a shaft to a depth of 150 feet, 80 feet below the level of the lake, which was only 200 yards distant, and the shaft was quite dry. Of course it will be remembered these are only indications.

One disadvantage of the diamond drill is that it does not at one hole show any considerable area of the cross section of the vein, and this is often urged against its use, as it is said you may hit the vein at a particularly rich spot or at a particularly poor spot, or you may hit it where the vein may have suddenly narrowed in or widened out, and thus get a totally false conception of the value or size of the vein, and that a few feet either way would show quite a different result. This is quite true, but the way to overcome that is to bore a number of holes from the same point, one below the other; this will test its width at various depths, and then bore a series of holes along the strike of the vein, and in this way a great area of the vein may be sampled very cheaply and in a short time, or a few holes may show from the nature of the vein matter that the deposit is of no value and money may be saved by not developing it. In the case of prospecting and locating ore bodies of minerals which do not occur in veins, but in irregular massive deposits, such as iron or nickel, the diamond drill is extensively used; in fact, for the determination and the extent of these particular kinds of mineral bodies they are almost exclusively used in many sections in preference to shaft sinking.

California Quicksilver Mines.

TO THE EDITOR:—I send you herewith a condensed statement for 1900 of four of the principal quicksilver mines in this State of which I am general superintendent, thinking they may be of interest to your readers:

NAPA CONSOLIDATED QUICKSILVER MINING CO., NAPA COUNTY.

Total cash disbursements	$162,946.64
Tons of ore mined and treated	30,784
Flasks of quicksilver produced	4,550
Average yield	.566
Cost per ton of mining ore	$2.99
" " " " inc. develop't work	$3.80
" " of ore reduction	.63
Tunnels, drifts and winzes excavated, feet	10,170
Average cost per foot	$2.47

ÆTNA CONSOLIDATED QUICKSILVER MINING CO., NAPA COUNTY.

Total cash disbursements	$61,078.29
Tons of ore mined and treated	11,888
Flasks of quicksilver produced	1,945
Average yield	.625
Cost per ton of mining ore	$2.74
" " ore reduction	$1.04
Tunnels, drifts and winzes excavated, feet	2,052

BOSTON QUICKSILVER MINING CO., NAPA COUNTY.

Total cash disbursements	$76,052.69
Tons of ore mined and treated	6,718
Flasks of quicksilver produced	816
Average yield	.41
Cost per ton of mining ore	$2.72
" " " " inc. develop'nt work	$5.36
" " ore reduction	.89
Old working opened and retimbered, feet	2,388
New shafts, drifts and winzes, feet	1,778

NEW IDRIA QUICKSILVER MINING CO., SAN BENITO COUNTY.

Total cash disbursements	$113,330,72
Tons of ore mined and treated	20,638
Flasks of quicksilver produced	3,990
Average yield	.74
Cost per ton of mining ore	$3.36
" " ore reduction	.68
Tunnels, drifts and winzes excavated, feet	2,067

At the Boston mine our energies have been directed towards opening up the property and equipping it with a modern plant. A new 60-ton furnace is about completed with new hoisting and tramway machinery, to handle quite extensive ore bodies opened up.

B. M. NEWCOMB, General Supt.

Oat Hill, Cal., Feb. 18.

An Unusual Ore.

TO THE EDITOR:—I notice valuable suggestions in your paper. I am interested in a mine in this State which contains fahlore or fahlerz ore. So far we have been unable to obtain a proper mode of treatment of this product. I thought possibly through your columns that I might obtain from some one of the subscribers a proper treatment of this class of ore. I would therefore invite a solution of this difficulty. C. R. C.

Denver, Colo.

MINING SUMMARY.

Specially compiled and reported for the MINING AND SCIENTIFIC PRESS.

ARIZONA.

COCONINO COUNTY.

The Eastern Star and Copper King mines, near Flagstaff, are being negotiated for by Eastern men.

COCHISE COUNTY.

The Lake Superior & Western Development Co., Supt. Graham, will sink a triple compartment shaft to the 500-foot level on the Martin Costello group, near Bisbee. ——The Spray shaft on the Copper Queen, near Bisbee, is down nearly 1000 feet.——New hoisting machinery for the Copper Crown, at Fairbank, is going in.

The now 80-stamp mill at the Commonwealth at Pearce is running steadily. One hundred and thirty men are employed.

GILA COUNTY.

Ore from the Ray group, at Ray, near Globe, first passes through a 400-ton-per-day Gates crusher, and is then carried over the 30-inch-gauge railway to the concentrating mill at Kelvin, 6½ miles below, on the Gila river; mill has a capacity of 250 tons of ore per day and is fitted with Cornish rolls, 12 iron jigs, 2 Chilean mills of 85 tons capacity each for crushing tailings from the jigs, 20 Hallett tables and a tube mill; latter is an iron cylinder 12 feet long and 4 feet in diameter, half filled with Norway flint pebbles ranging in size from about ½ inch to 2 inch mesh; middlings from the tables are conveyed to the tube mill by a sand pump, are ground to about 60 mesh, and then returned to the tables, where all values are extracted; power is supplied by gasoline engines of aggregate 400 H. P.——The Pinal Copper Co., which recently bought the Black copper mines, 8 miles west of Globe, will put in a hoist; sinking of a shaft is in progress; Supt., P. Howle.

Work is under way on the Bradley group, near Globe.——Owing to lack of patronage the Globe sampling works have closed down.

GRAHAM COUNTY.

The Arizona Copper Co. is shipping 1000 tons of black copper from its works at Clifton per month. A concentrator, with a capacity of 500 tons of ore per day, is going up at the foot of the Longfellow incline, in Chase canyon. A foundry is also being built above the Clifton works. ——The Detroit Copper Co. will run a 1500-foot tunnel near Morenci.——A 10-stamp mill will go in on the Homestake group, on the San Francisco river, above Clifton.

A body of good copper ore is reported found in the Harrisburg, in Black Rock district, at a depth of 100 feet; O'Neal, Jones & Woon, owners; work is being pushed and shipments of ore will soon be made.——Supt. Knowles, of the Lone Star group, in Lone Star district, 9 miles northeast of Safford, reports finding a body of good ore recently.

MOHAVE COUNTY.

The Philadelphia & Arizona M. Co. is pushing work on the Minnesota-Connor mines, at Chloride, with good results.

Work is progressing favorably at the Ben Butler, in Aubrey district.——A vein of good milling ore is reported struck in the Lolita shaft, near the Ben Butler; ore will be packed out to the Tremain mill, at Aubrey.

MARICOPA COUNTY.

The Acme Smelting & Ref. Co. project a custom smelting plant and reduction works at Wickenburg.——G. E. Lamb, of Clinton, Iowa; B. O. Hatfield, of Pony, Montana, and G. B. Upton are opening a copper and gold property near Wickenburg, sinking and crosscutting. Surface croppings show dyke to be from 60 to 100 feet in width.

Wickenburg, Feb. 13.

The first smelter ever erected in Phœnix was started up recently for a test run. Everything worked successfully.

SANTA CRUZ COUNTY.

The Melczer M. Co., operating the Copete, near San Miguel, has received a traction engine and six wagons, and it will begin freighting coke, bullion, etc., between the mine and Carbo.

YAVAPAI COUNTY.

Near Mayer, Supt. Haggott reports progress made at the Blue Bell.——Work on the Scoyoc, near Mayer, is suspended temporarily owing to snow and rain.——The tunnel on the Copper Queen will be extended another 100 feet.——Good progress is being made in sinking the main shaft on the Copper Ash; a ledge of good ore was recently opened up at a depth of 115 feet; ore carries gold, silver and copper.——Supt. Kingsley is pushing work near Huron; fifteen men are employed. ——The shaft on the Iron King, near Mayer, is down 105 feet; the crosscut at that depth is in 95 feet; good ore is being taken out.——The Golden Cop. Realty Co. is pushing work on its property, southwest of Mayer.——Good copper ore is coming out of the shaft on the Cypress, near Mayer, now down 210 feet.——High-grade gold ore from the Henrietta is being piled up at the mill for a run.——The Yavapai Cop. Co., owning twenty-five claims in the Black Hills, near Prescott, will build a smelter on the edge of Agua Fria valley, and will put in a spur from same to the P. & E. railroad.——The National Finance M. Co., operating the White Horse group, on Lynx creek, in Walker district, are making preparations to erect a 10-stamp mill on the property this spring.——The Lincoln M. & M. Co. (now being organized) will take over the Lincoln group, near Jerome, and develop same; a 3-stamp mill will go in, stamps to weigh 1000 pounds each, and to drop 120 times per minute.——Work on the new railroad between Jerome and Williams will begin soon.——The tunnel on the Verde Chief, in Black canyon, now in 200 feet, will be driven an additional 200 feet; two shifts are employed.

CALIFORNIA.

AMADOR COUNTY.

At Amador City the drift from the east shaft to cut the lower levels of the present workings of the Kennedy is driven over 200 feet from the shaft.——The drifts in the old works of the Bunker Hill, near Amador City, will be cleaned out and straightened up. —— The shaft on the Peerless is down 660 feet.——At the Kirkwood the shaft is down 270 feet; sinking will be continued.——The Moon G. M. Co. will begin work on its copper properties in Camp Opra district.

Supt. C. C. Derby has the shaft at the Oneida, near Amador City, down nearly 2000 feet. One hundred and twenty men are employed in the mine and mill. Sulphurets are being shipped. A new saw mill is going up.——A new level will be run at the South Spring Hill, near Amador City. More men will be put on.

BUTTE COUNTY.

There are nine dredgers in operation on the Feather river, south of Oroville; each one employs about seven men, and operating expenses are about $1000 each per month.——The Hesperian Crude Oil Co. and the Grando Chico Oil Co. are organized to bore for oil near Chico.

CALAVERAS COUNTY.

Work is resumed on the French Hill tunnel, near Mokelumne Hill; Supt., T. McSorley. —— The machinery from the old Union mill, near Lower Placeritas, is going in on the Sugar Pine, near Murphys. ——The San Justin, near Angels, is flooded with water, an explosion of a charge of dynamite having opened up a subterranean river; it will be several weeks before operations are resumed.——The Mead G. M. Co. will sink a main shaft on its property, near Rich Gulch.——Work is started on the Buffalo (gravel), formerly known as the Starlight, in Chili Gulch, near Mokelumne Hill; a new mill will soon go in; a new hoist is in, and is being run under a 300-foot head of water to unwater the mine; C. A. Werle, owner and manager; drifts east and west to crosscut the Blue Lead Channel will be run.——At Murphys, operations on the Ozark are going ahead satisfactorily; a clean-up will probably be made soon.——Good ore is reported being taken out at the Big Horn, on San Domingo——The compressor at the May Day broke down last week, occasioning a temporary suspension of operations; work is now under way.——Work is progressing satisfactorily at the Sugar Pine, near Murphys.——At Sheep Ranch, development operations are suspended; pumps are working, however.——Good ore is reported opened up in the Angels, at Angels. —— Extensive developments are projected for the Oriole, at Angels.——The ledge recently struck in the Modoc, in Pioneer district, is improving with development.

The Calaveras Group, the Right and Left Bowers, the Washington, the Fenian and the Fricot, near Murphys, are lying idle.——J. Heinsdorf is overhauling and repairing his mill, preparatory for a continuous run when the weather will permit the hauling of ores from his properties near Murphys; ore from latter runs from $8 to $12 to the ton.——The Duchess will ship ore to J. Heinsdorff's mill for a test. ——The tunnel in the Delay is in 2000 feet; a strike is reported.——Work is in progress on the Union (copper), near Angels.——An air compressor and new pipe were recently put in at the Schmedke. ——Good progress is being made at the Melones, at Robinson's Ferry.——At the Cross the air chamber on the 26-inch water pipe leading to the shaft is in and working satisfactorily.——Work at the Tullock is suspended pending return of Supt. Guffey.——New machinery is going in at the Lockwood, at Mokelumne Hill.——The machinery from the Belden, in Amador county, is being put up near Railroad Flat.

EL DORADO COUNTY.

Work is progressing at the Starlight at El Dorado; L. M. Davis, foreman.

INYO COUNTY.

Owing to heavy snow, mining operations near Darwin are temporarily suspended.

The 20-stamp mill at Castle Peak will start up this spring.——Mining operations near Lundy are under way, and it is expected that the 20-stamp mill near there will start up soon.——Wood is selling at from $11 to $14 per cord.

KERN COUNTY.

The Silver King Oil Co., operating in the Kern river field, will begin drilling for oil.——The Globe Oil Co., operating in same field, struck oil sand at a depth of 460 feet five days after the drill was started on its No. 5 well; General Manager McQuigg.

The Occidental-Sonora Oil Co., capital $5000, is organized at Sonora, to develop 200 acres oil land in the McKittrick, Midway and Sunset districts.

LOS ANGELES COUNTY.

The Alleghany Oil Co. is drilling its first well on its property, near Melrose and Vermont avenues, Los Angeles.——The Hecla Oil Co. is putting in a rig on its 10-acre tract on Rosedale avenue.

MADERA COUNTY.

The California Copper Co. has made arrangements to sink the main shaft at the Ne Plus Ultra mine to a depth of 750 feet.

Operations on the We've Got It, at Grub Gulch, will begin soon.

MARIPOSA COUNTY.

What is reported to have been the first cleanup in thirty-five years at the Mariposa mill, at Mariposa, was made last week; mill started December 26, 1900; crushed 1600 tons ore, yielding $16,000 in bullion.

NEVADA COUNTY.

The old Mistletoe, now known as the Canfield, at Rough and Ready, is being put in shape for a run; new hoisting and pumping plants will go in.——The Providence, at Nevada City, is now being worked under the tribute system.

ORANGE COUNTY.

The Brea Canyon Oil Co. has completed its pipe line to Fullerton.——The Olinda Oil Co. is drilling its third and fourth wells; wells Nos. 1 and 2 are abandoned.

PLACER COUNTY.

The Central G. M. Co., capital $100,000, is incorporated at Dutch Flat.

PLUMAS COUNTY.

Operations at the Plumas Imperial, near Quincy, will start up next month; a debris dam was built at the Plumas Imperial No. 2 last fall; C. D. Hazzard, Supt. and owner.——At the Four Hills, near Johnsville, work underground is in progress.——The Bushman gravel mine, near Quincy, which was recently sold to C. D. Hazzard, is under development; Mr. Hazzard will put on more men in the spring and will push work on a larger scale.

RIVERSIDE COUNTY.

Good reports come from the Red Cloud, 30 miles from Salton; fifty men are employed; the 100-ton smelter and the two 10-stamp mills are completed and will start up shortly; mills will handle 300 tons of ore per day at an estimated cost of 65 cents per ton.

SAN DIEGO COUNTY.

Operations at the Monarch and Victory oil wells, near San Diego, are suspended temporarily.——Ore running 25% copper is reported opened up on property 25 miles from De Luz.

Suit is begun in the Superior Court of the county to recover one-half interest in the Litizolite, near Pala, containing extensive bodies of lithia-bearing rock; J. Stewart, plaintiff; N. C. Douglas, defendant.

SAN JOAQUIN COUNTY.

A cement works, with an output of between 300 and 600 barrels cement per day, will be built at Stockton.

SANTA BARBARA COUNTY.

The St. Anthony Oil Co. is drilling for oil on the beach, at Santa Barbara; the drill will go down 1500 feet if necessary. ——The Western Union Oil Co., operating near Santa Barbara, has struck oil at a depth of 2000 feet; twenty-five barrels of oil are now being taken out, and oil has risen 300 feet in the well; oil is about a twenty-five gravity product.

SHASTA COUNTY.

The Black Bear, on Salmon creek, is reported sold for $200,000 to Eastern men.

The town of Harrison Gulch was partially destroyed by fire on the 17th instant. ——Redding hears that the Balaklala M. Co. will construct a railroad from the mine to the S. P. main line and erect a smelter with 1000 tons capacity.

SIERRA COUNTY.

The group of placer claims on Chaparral hill, near Downieville, is sold to the Hilo M. Co., for $4000: a 500-foot tunnel is to be run on the property, repairs and new additions will be made to buildings, machinery, etc., and work pushed.——The Buckhorn, near Longfellow, is closed down temporarily.——Mining operations near Brandy City are suspended temporarily, owing to severe weather.

SISKIYOU COUNTY.

The Fernandez M. Co., operating at Cherry Creek, is stripping its ground by means of blasting; it is thought the claim will produce $20,000 this season ——The new mill at the Dewey, Gazelle district, is nearly completed.——The Siskiyou hydraulic placer at South Fork, E. Boyer general Supt., is closed down, owing to freezing weather.

TUOLUMNE COUNTY.

At the New Era, near Sonora, stoping is in progress on the 100-foot level.——An eighty-light dynamo is going in at the Black Oak.——The new 10-stamp mill for the Duleek is in and running satisfactorily.——A 2-foot vein of solid quartz is reported found between Groveland and the Slap Jack by W. Coyle; development work will be started immediately.——Supt. Holmes of the Mohican M. Co. has men working on the Lilian at Sonora.——Work is in progress on the old Street, near Tuttletown; Supt. R. Kinsman.——W. Berry has started work on property near Ward's Ferry, 6 miles southeast of Sonora; a shaft is sunk and a drift is run. ——Forty-two acres of mineral land 2 miles from Ward's Ferry are reported sold to H. J. Dyke, of Oakland; Mr. Dyke already has a 120-foot shaft, a mill and a hoisting plant on the property.

The Worcester, at Carters, has resumed operations.——Vansyckel, Carmen & Co. have bonded the Kodak and Morning Star properties and will sink a new shaft. ——A shoot of rich ore was recently struck on the Mayflower; more men will be put on soon; Supt. Winwood.——The Seminole is still idle.

Drifting is in progress on the 500-foot level of the Mazeppa, at Sonora; ore runs about $9 to the ton; Supt. Moore.——A streak of rich ore is reported on the 700-foot level of the Jumper.——At the Republican, thirty-five men are working and the mill is running steadily; drifting and crosscutting are under way.——The mill at the Longfellow, which temporarily shut down last week owing to a break in the engine piston, is running again; the building of the addition to the mill is delayed owing to stormy weather and bad roads.——The old Keltz, at Columbia, may be reopened.——Work on the Sitting Bull, on Knights creek, near Columbia, is progressing satisfactorily.

At the Miller & Warner, in Jawbone district, an arrastra is working steadily. ——The DeBeers M. Co., owning 2000 acres land in Jawbone district, near Groveland, will push work this spring. The Yosemite G. M. Co., operating the Little Gap, Hoffman and Donahue placer claims, near Gravel Range, has closed down operations temporarily; as soon as weather permits, men will be put on and a 6-mile ditch built to the Donahue.——Operations on the Laguria, near Groveland, are resumed, and three shifts are now working; Supt. J. M. Meighan is taking out good ore.——The Clio mill, at Jacksonville, is running steadily.——As soon as lumber arrives on ground, work of putting in additional ten stamps at the Longfellow mill, at Big Oak Flat, will begin.——It is reported that the Moody, at Big Oak Flat, will resume this spring under Supt. W. A. Nevills.——Byrn & Herndon are working the Ophir, at Deer Flat.

VENTURA COUNTY.

The Sobra Vista Oil Co., owning 337.76 acres oil land near Santa Paula, being sections 2, 3 and 11, township 4, range 22, in Ojai valley, is putting in machinery.——A new oil company will take over and develop the holdings of the Ferndale Petroleum Oil Co., near Santa Paula.——The Home Oil Co. is drilling its No. 1 well on South Mountain, near Santa Paula.

Three hundred and twenty acres oil land near Santa Paula are sold to Los Angeles men for $35,000.——The Slocum Oil Co. is drilling its eleventh well.——The Santa Paula Home Oil Co. has a well down 700 feet.——The Union Oil Co. has abandoned its 1500-foot hole in Adams canyon, owing to casing becoming jammed.

COLORADO.

CHAFFEE COUNTY.

An electric light and power plant is projected at Cascades, in Chalk creek canyon, by the St. Louis, Mo., company now running the deep tunnel into Mt. Princeton, to cost about $30,000.

CLEAR CREEK COUNTY.

The Silver Age mine and mill, at Idaho Springs, is reported sold to the Colorado & California M. Co. A contract is entered

into by the latter company with the John Owen Co., whereby the former will be able to work its vein through the John Owen. The adit on the Silver Age is in 1500 feet, a new shaft will be sunk at the dividing end line of the Franklin and Silver Age; the latter mill will be overhauled and a new water wheel will be added.

The tunnel of the Empress Tunnel & Development Co., at Empire, is in 3000 feet; a new shaft house will go in, and shaft will be timbered; the name is changed to the Hartford M. Co.

GUNNISON COUNTY.

At Crystal, the Fargo incline shaft is unwatered and cleaned out and new track is being laid; new machinery at the mouth of the incline will go in soon; A. Fraser, manager.

HUERFANO COUNTY.

The Duplex M. Co. is pushing work on its property in the Spanish Peaks, near Walsenburg.

LAKE COUNTY.

At the Dex group, Breece Hill, Leadville, the boiler power is consolidated into one plant of twelve boilers at No. 3 shaft. In a building 800 feet from the boiler plant is the compressor and dynamo room. Three compressors operate thirty air drills. Two dynamos, having 600 and 800 C. P. capacity, respectively, furnish light for the surface premises and the underground workings. A system of flash-light signals is operated at all stations, and preparations are being made to put in electric bells. A new device has been produced that will act as a chair indicator, and which will be under the observation and control of the hoisting engineer. It will show him at all times whether any station chair in the shaft is open or closed, and will enable him to manipulate it. Two pumps at the 1000 foot station of No. 4 shaft have a capacity of 2000 gallons per minute. At present 800 gallons per minute are being handled. A portion of the present output of 250 to 300 tons per day is hoisted from practically every level from the 200 foot down to the 1000, the levels ranging about 100 feet apart. The underground workings, which aggregate between 10 and 50 miles of shafts, levels, drifts, winzes and upraises, develop the ledge of oxidized ores nearest the surface and exploit the sulphide bodies which are found from the 300 and 400 foot levels downward. The oxidized body approaches a horizontal position, the sulphide zone being more nearly vertical. The Dex group is 5 miles east of Leadville and 1500 feet higher. S. W. Mudd is general manager; James H. Healey, mine superintendent. The Dex and Breece Hill locality is reached by a branch of the D. & R. G. railway, which passes up Big Evans gulch, furnishing shipping facilities to all the mines in that section of the district.

Leadville, Colo., Feb. 10.

J. H. Dunn has leased the Mammoth Co.'s group on Breece hill, at Leadville, and will interest Eastern men in the enterprise, put in a plant and sink a shaft.——The Rag C. M. Co., operating in Lincoln gulch, 7 miles from Leadville, projects a large mill. —— Manager Guth reports progress at the Banker; it is said that up to the present time about $160,000 have been expended in development.——The Greenback is nearly unwatered. Operations at the New Elkhorn are expected to resume by March 1st.

A strike of rich ore is reported made on the 315-foot level of the Ollie Reed, at Leadville; a drift is being run to tap the upper ore.

The Frank, on Printer Boy hill, Leadville, is shipping ore averaging $7. The old Printer Boy mill, near the Frank, has been remodeled and it is now capable of handling thirty tons of Frank ore per day; O'Mahoney, McKee, Maurer & Taft lessees.

OURAY COUNTY.

The Iowa & Smelter Trust, in the Snellels district, near Ouray, is sold to Cleveland, Ohio, men for $45,000.

SAGUACHE COUNTY.

Near Crestone the Broken Tree M. Co. is pushing work. —— It is locally reported that a fifty-ton custom mill will be built in the district by June.——The Good Enough group, same district, is reported sold to Cripple Creek men; two shifts will be put on.

The erection of three mills is contemplated at Bonanza this year.——Ore recently shipped from the Eagle ran about $80 to the ton.

SAN JUAN COUNTY.

The Hurley tunnel, now being driven into Sampson mountain from the south fork of Cement creek, near Silverton, now in 500 feet, will be driven to Las mountain, 2200 feet from daylight; a fifteen-drill air compressor, a battery of three boilers and an electric light plant are to go in by May 1st.

The Fleece group, in Picayune gulch, near Eureka, is bought by the Fleece G. M. Co.; a crosscut is being run.

SUMMIT COUNTY.

The old Robinson, at Ten Mile, is being operated again; the shaft will be sunk to the 500 foot level.

The Mount Gilead tunnel, on Ten-mile range, near Pacific Peak, is in 900 feet; the Glen Mohawk tunnel, same locality, is in 700 feet.——Good progress is being made in driving the crosscut tunnel on the Lauriam, near Breckenridge.——The Augusta Juventa M. & M. Co., in driving its long crosscut tunnel to cut the Juventa vein, recently struck a flow of water estimated at 1000 gallons per minute and operations were stopped; Manager Griffith is putting in a Buffalo air exhauster, engine and boiler at the mouth of the tunnel. —— A 3000-foot tunnel is being driven by the Gold Run M. & M. Co. on Mineral hill.

TELLER COUNTY.

It is reported that W. S. Stratton may buy all properties on Raven hill, near Victor, from Windy Point to and including the Abe Lincoln on the south. —— Lessee Bell, on the southeast end of the Amanda, is drifting on the 100 foot level —— Drifting south on the 160 foot level of the main block of the Mary Ann, on Raven hill, is in progress. ——Ore running $30 to the ton is being shipped from the Jos Dandy, on Raven hill. —— The Economic mill of the Woods Investment Co., is shut down; the Columbine Victor tunnel, at Columbine, connecting the mill with the Gold Coin, now in 2000 feet, will go in an additional 700 feet; the electric locomotive which will haul through this tunnel is on the ground. —— On the Bonnie Nell, the Bonnie Nell M. Co. has drifted 35 feet west on the 300-foot level; ore from the 200-foot level is running at about $15 to the ton.—— The output of the Gold Coin, Cripple Creek, for the month of January was 3400 tons of ore, most of which came from the 850-foot level; work is also in progress on the 1000-foot level.

A body of good ore is reported on the 275-foot level of the Damon, Cripple Creek.—— The crosscut on the 400-foot level of the Eclipse is 160 feet.——Regular shipments of ore are being made at a depth of 450 feet below the tunnel level of the Anaconda.——A 25 H. P. boiler goes on the Bairman lease on the Woodman of the Merrimac Co. —— At a depth of 165 feet on the Jerry Johnson a 2-foot body of ore assaying from $40 to $300 to the ton is opened. —— A new pump will go in at the Morning Glory; daily output of the mill is given as $6000; ore averages about four ounces gold to the ton.

A body of good ore is opened up at 110 feet in the Sedan at Cripple Creek.—— In the old Moose, on Raven hill, a vein of good ore is struck at the 150-foot mark in the north drift on the 1050-foot level.——The Morning Glory shaft will be unwatered to the 700-foot level, at which point a drift will be run to cut the Doctor 100 feet below the present workings. A crosscut will be run at this depth; sixty-five tons of ore are being shipped daily. —— The shaft on the Bob Lee, now down 150 feet, is expected to reach the 300-foot level by April 1st.

IDAHO.

BLAINE COUNTY.

The Tiptop mill, at Hailey, is to start up. —— A larger mill and a hoisting plant will go in on the Crœsus mine, near Hailey.——The Golden Star will start June 1st.—— It is expected that new mills will go in on the Liberal and Maggie May claims, near Hailey, next fall.

LATAH COUNTY.

The Syndicate, on Gold creek, near Kendrick, is sold to Seattle parties, and the name of the property is changed to the Jericho. Two shifts are employed.

NEZ PERCES COUNTY.

Ore from the Ajax, in the Dixie section, near Lewiston, runs from $15 to $20 gold to the ton; Campbell & Finch of Spokane, Wash., owners.

SHOSHONE COUNTY.

The new concentrator going in at the mouth of Government gulch, 2 miles below Kellogg, for the Empire State Idaho M. & D. Co., is nearing completion.——The Hypothesis M. Co., capital $150,000, is incorporated at Wallace.

The Murray Dev. Co. has three shifts running a tunnel on the Beartop, near Murray; tunnel is going ahead at the rate of 4 feet per day; ledge is expected to be reached by March 15th.

MONTANA.

CASCADE COUNTY.

The Boston & Montana M. Co. will put in two auxiliary steam plants one of 1500 H. P. and the other of 1000 H. P.—at Great Falls.

MADISON COUNTY.

Pritchett & Eastridge have a renewal of their lease on the Keynote, in Georgia gulch, near Sheridan.——A new strike is made on the Toledo, at Brandon, 3 miles east of Sheridan; Manager Lortie.

PARK COUNTY.

About forty tons of ore are being run through the mill daily at the Jullen, near Livingston.

NEVADA.

ELKO COUNTY.

Eighteen men are laid off at the Dexter Tuscarora, at Tuscarora.

HUMBOLDT COUNTY.

A suit, involving possession of the Nelson group, on Jackson creek, near Winnemucca, is begun in the U. S. District Court at Carson; Snow & Co., plaintiffs, J. A. Nelson, defendant.

LINCOLN COUNTY.

Messrs. Evans & Kent have bought all the lead prospects of Messrs. Bybee, Smith & Meyers for $8000. —— C. M. Over is shipping another car lot of copper ore. —— C. A. Beck is pushing development work on his lead mines, the outcrop of which is cerusite, running 70% lead. The vein is 6 feet thick by 20 feet in width. —— The California Con. M. & R. Co. will put seventy men to work on the Half Moon mine, near Pioche; Supt. S. Godbe. —— There is a heavy snowfall throughout Lincoln county, thus insuring water for the coming summer.——Messrs. Smith & Cook have sold five lead claims to Senator Perkins and U. S. Attorney J. H. Call.

Good Springs, Feb. 16.

The January run of the new Horseshoe mill, at Fay, amounted to $20,000; more tanks will be added to the plant.

A telephone line is being run to the Abe Lincoln group, near Pioche.

LYON COUNTY.

C. S. Batterman of Butte, Mont., and others, operating in Mason valley, near Dayton, will put in a 150-ton smelting plant.

STOREY COUNTY.

On the Con. California & Virginia, at Virginia, the northeasterly drift from the fourth floor in the winze sunk from the old north drift at a point 70 feet in from its mouth, is in 36 feet; during week ending Feb. 16th four cars (233,500 pounds railroad weight) of ore, of average assay value of $54.08, were shipped to the Selby Smelting & Lead Works, at San Francisco, Cal.——The northwest crosscut from the southwest drift on the 1700-foot level of the Ophir is run 381 feet.——The west crosscut, started at a point 90 feet in from the mouth of north drift No. 2 on Central Tunnel level of the Mexican, is in 303 feet; face in hard porphyry.——The Hale & Norcross tunnel is in 2029 feet.—— Stoping is still in progress on the first, second, third, fourth and fifth floors of the 325-foot level of the Gould & Curry; 224 tons of ore from the eleventh, twelfth and thirteenth floors of the 425-foot level, recently milled, ran $10.25 gold to the ton, as per battery sample.—— The west drift from crosscut No. 9 on the 425-foot level of the Best & Belcher is in 91 feet; face in quartz and porphyry.——Surface tunnel No. 2 of the Utah is in 875 feet; face in hard porphyry.

WASHOE COUNTY.

Operations on the Crane, east of Steamboat Springs, are resumed.

WHITE PINE COUNTY.

The Chainman M. Co., at Ely, is putting in new machinery, consisting of two pumps—a sinking and a station pump—400 feet of steam pipe, etc.; sinking pump has a capacity for handling 225 gallons water per minute, and the station pump is capable of throwing water 720 feet; the Pelton wheel will soon arrive from San Francisco, when it will be put in place.

A shaft is being sunk and a crosscut run on the property at Ely recently bought by Shear, Giroux, Snedaker and others.

NEW MEXICO.

GRANT COUNTY.

The new concentrating mill at Deming is running successfully. —— A strike of rich copper ore is reported made on the Notion, near Hanover; Brigg & Doyle, owners. —— New machinery is going in at the Empire M. Co.'s mill, at Hanover; Manager J. W. Bible.——C. Smith, of Silver City, is putting in a 10-stamp mill 6 miles north of Stein's Pass; water will be supplied from Animas valley, 5 miles distant; upon arrival of water pipe latter will go in, and mill will start up on ore from the Volcano; Mr. Smith is Supt. and Gen'l Mgr.——Fritter & Crawford, operating on the Santa Rita, at Santa Rita, are taking out shipping ore.—— The old mill machinery of the Santa Rita Co., which was destroyed by fire some time ago, is being sent to the El Paso, Texas, foundry.——A shaft is being sunk on the southern extension of the old San Jose, near Santa Rita.

OREGON.

BAKER COUNTY.

L. G. Wheeler, operating the St. Anthony group, near Sumpter, has run the crosscut tunnel about 600 feet, and has cut four ledges, the average width of which is 297 feet. Work will be pushed, and it is probable that an air compressor and drills will go in in the spring.

JACKSON COUNTY.

A deal is under way whereby A. M. Lowry and others of New York may take over the Keystone and Champion claims on Jackson creek, near Jacksonville. Should the deal go through, a 5-stamp mill will be put in.

JOSEPHINE COUNTY.

Two giants are running constantly at the Wimer & Reamos placer mine, at Waldo.

SOUTH DAKOTA.

CUSTER COUNTY.

The Iron Mountain M. Co., operating at Iron Mountain, 12 miles northeast of Custer, is mining ore that carries an average of $3.25 gold to the ton. —— The Chicago Mica Co. is shipping mica from the Crown, near Custer, to Valparaiso, Indiana. —— Operations at the Hardin are under way, unwatering of the Two Hit shaft being nearly completed.

LAWRENCE COUNTY.

Work on the new plant of the Dakota M. Co. at Deadwood is under way. —— The Belt Development Co. will sink a 600 foot shaft between Kirk and Lead.

Philadelphia and New York men, who recently bought a group of tin-bearing claims, in Bear gulch, near Lead, will project a 150-ton concentrating plant; a railroad will probably be built to the plant. —— The Gold Coin M. Co. is organized, and the Deadwood-Bear Gulch Co. is reorganized; both companies will put in steam hoisting plants this spring. —— The Trent M. Co. has opened a ledge of horn silver ore at Carbonate.

PENNINGTON COUNTY.

Ore from the Cape Nome group, 6 miles north of Rochford, assays 25% manganese and 8% nickel. Ore was recently shipped to Omaha, Neb., for treatment.

UTAH.

BEAVER COUNTY.

The Royal Copper M. Co., capital $600,000, is incorporated at Salt Lake to work properties in this county; A. P. Lewis, Frisco, is agent of the company for Utah.

BOX ELDER COUNTY.

The tunnel on the Golconda, at Park valley, is in 320 feet.

GRAND COUNTY.

A company is organized to build an electric railroad from Richardson, on the Grand river, to the foot of Miners' basin, 20 miles, ultimately extend the line to the Paradox section, 35 miles farther, to bring it into easy reach of the Rio Grande Southern Railroad. Should the line be built, it is said that the Iowa, Corsair, Tornado and Indiana mines will be able to produce 200 tons of ore per day. —— Another company is organized to build mills and smelters at the river terminal of the line and furnish electric power necessary for the operation of the road.

JUAB COUNTY.

The main shaft on the Eagle & Blue Bell, at Mammoth, is down 380 feet; a drift on this level has opened up a large body of low-grade ore, carrying streaks of high-grade ore; picked samples from the latter gave 120 ounces silver and $60 in gold to the ton. —— The Carissa, at Mammoth, is shipping ore running 30% copper.——A three-fourths interest in the Missouri Pacific, in Death canyon, near Tintic, is bonded to R. D. McCreery for eighteen months for $7500.—— Work at the Eureka Hill will resume soon. —— The shaft on the Little Chief, now down 600 feet, will go to the 800-foot level. —— Good ore bodies are opened up on the 700 and 900-foot levels of the Beck, at Eureka.

Shipments of ore from the mines of Tintic during last week were as follows:

	Cars.
Centennial-Eureka	22
Bullion Beck	4
Gemini	10
May Day	1
Mammoth	16
Godiva	5
Grand Central	3
Lower Mammoth	2
Carissa	4
Tesora	4
Swansea	5
South Swansea	2
Star Con.	7
Undine	1
Total	86

CONCENTRATES.

Mammoth Mill	2
Eureka Hill Mill	1

BULLION.

	Bars.
Mammoth Mill	3

Supt. D. C. Sullivan states that drifting both ways is in progress on the 350-foot

level of the Primrose at Silver City.——A new strike is reported made on the 600-foot level of the Little Chief at Tintic.——More men were recently put on at the La Reine; machine drills will go in by March 1st, it is thought.——At the Bullion-Beck, at Tintic, eighty men are working; work is in progress on the 300-foot level; A. E. Hyde, assistant manager.——Operations at the Grand Central are resumed.

SALT LAKE COUNTY.

Ten cars of copper matte from the new Bingham C. & G. M. Co.'s smelter, at Bingham, recently reduced at Taylor & Brunton's sampler, at Salt Lake, averaged about 16% copper; matte will be treated by the American Smelting Co.——The Nast, at Bingham, is shipping ore.——The Vespasion & Hoogley M. Co., operating a group of claims at the head of Markham gulch, in Bingham district, will extend the tunnel, now in 500 feet, to the 600-foot mark, at which point drifting will be started.

Manager Keel reports the Butterfield mill at Queen tunnel, near Bingham, running O. K.——Work is under way in the Amazon tunnel of the Mystic Shrine group; Manager E. W. Young.——A cross-cut is being run on the Tin Horn.——An engine-bed foundation is being built at the Shawmut powerhouse; a 10 H. P. engine will go in to run a dynamo which will drive three electric drills.——The Fire King at Bingham is sold to the St. Joe M. Co. for $2500.

WASHINGTON.

FERRY COUNTY.

The shaft on the California will reach the 200-foot level March 1. Stoping is in progress on the 100-foot level. The low-grade ores will be shipped to the Granby smelter at Grand Forks, B. C., and the high-grade ore will be shipped to Trail, B. C. The last shipment sent out, consisting of 11¾ tons, returned $1470.——At the Princess Maud at Republic work is in progress on the 300-foot level, below the tunnel level. The north drift is in over 55 feet and the south drift is in over 35 feet. During the last seven months 200 feet of shaft has been sunk and 200 feet of drifts have been run. One shift is employed; Supt. M. Hodges.——The Republic mill at Republic is receiving custom ore. It is thought that the new auxiliary crushers will be running this week.——A recent smelter test of fifty pounds of ore from the ledge recently opened up on the 150-foot level of the Gold Cord at Keller gave returns of $69.70 in silver and copper. A 350-foot tunnel is being run to tap the ledge at a depth of 270 feet. The tunnel, now in 80 feet, is progressing at the rate of 6 feet per day (24 hours). A car and track are in the lower tunnel.——Work on the Big Chief, adjoining the Gold Cord, will be resumed shortly. A 100-foot shaft will be sunk.——The tunnel on the Caledonia is in 75 feet. Work is suspended pending a deal with Rossland, parties.

OKANOGAN COUNTY.

The lead on the Copper World, on Palmer mountain, 4 miles from Loomis, is 15 feet wide; the tunnel is in 225 feet, and it has cut the vein at a depth of 100 feet.——The tunnel on the Lakeview, on Mount Ellemeham, now in 265 feet, opened up a body of rich silver ore recently; a cross-cut is being run.——Rich ore is reported being taken out of the Palmer mountain tunnel.

STEVENS COUNTY.

The Gold Standard, Gold Bug, Copper Butte, Silver Tip and Gold Coin, in Pierre Lake district, are reported sold to the Consolidated Gold Bug M. Co. A 110-foot shaft is sunk on the property at a point 150 feet from the line between the Gold Bug and Silver Tip. The ore averages about $30 to the ton at present depth. A new hoist, Buffalo whim, Knowles sinking pump, feed pump and other machinery are going in, and everything is expected to be in shape to run by March 1; Supt. Harris.

The new furnace at the Northport smelter is about ready to be blown in, and the fifth furnace is expected to be ready within a month, making capacity of smelter 1350 tons.

SPOKANE COUNTY.

The Ohio Oil & Gas Co., capital $100,000, is incorporated at Spokane.

The Kootenai Copper M. & S. Co., capital $30,000, is incorporated at Spokane.

WHITMAN COUNTY.

McCoy, Brewster, Conrad & Robinson, operating near Oakesdale, are putting in new drills.

WYOMING.

CARBON COUNTY.

The vein on the Elk, on Elk mountain, near Saratoga, Supt. W. R. Wilcox, is reported to be 100 feet wide; ore assays 20% copper; the Elk Mountain M. & M. Co. is incorporated to work this mine.

FREMONT COUNTY.

At the Carissa at South Pass sinking of the shaft is in progress. An air compressor is ordered. The mill will probably be enlarged.——Manager J. Boylan is working the Burr, near Lewiston.

FOREIGN.

BRITISH COLUMBIA.

The Consolidated Cariboo Hydraulic M. Co., operating 200 miles from Ashcroft, employs 150 men. The company is now putting in supplies, etc., for six months, besides $11,000 worth of miscellaneous machinery; Supt. J. B. Hobson.——What is said to be the first heater and purifier for utilizing mine water for steam making purposes in the Boundary district has been put in at the Old Ironsides, near Phœnix. The heater has a capacity of heating water to feed 500 H. P. boilers. In connection with the heater there is a pump capable of feeding 300 H. P. boilers. The process is simple. The mine water is pumped directly into the top of the heater, in which is arranged a pyramid of iron pans, the water dropping from one pan to another, the pans collecting the lime and other impurities. It is said that the heater has already made a saving of nearly one-half of the fuel generally used.——New furnaces and a converter will go in at the Granby smelter at Grand Forks this year, doubling the capacity of the smelter, enabling it to treat 1200 tons of ore daily; A. B. W. Hodges Supt.——The Kilo and the Chapleau, on Lemon creek, in Slocan district, are to be consolidated. Pending negotiations the mine and mill are closed down. Upon the completion of the deal operations will be resumed.——The Humming Bird, near Greenwood, has resumed shipping ore to the Granby smelter at Grand Forks. Sixty-one tons of ore recently shipped returned an average of .96 ounce gold and 1.5 ounces silver to the ton. The average of previous shipments of 172 tons was $20.89 per ton. Supt. E. W. Liljegran reports good results in development.——The Carmi, on the west fork of the Kettle river, is making regular shipments to the pyritic smelter at Grand Forks, it being under contract to ship 2000 tons of ore. The ore is hauled in sleighs to Midway, a distance of 50 miles, and from there it is shipped by rail to its destination.——The Republic group, on Erin mountain, 2 miles from Slocan, is reported sold to C. Dempstu of Rossland.——Work is progressing satisfactorily on the Soho group, in McGuigan basin, near Slocan. The tunnel is 1000 feet long. Supt. J. C. Ryan states that shipments of ore will begin soon. More men will be put on.——The Silver Belt group, on Toby creek, in Windermere district, is showing 4 feet of ore.——A shipment of 16¾ tons of ore recently from the Bondholder, near Slocan, to the Nelson smelter returned 235 ounces silver and 6¼% lead to the ton. The net receipts from the smelter, after paying freight and treatment charges, were $2400.——Ore from a depth of 120 feet in the Waterloo at Camp McKinney is said to run from $19 to $388 to the ton.——Shipments for 1901 to date of the mines near Slocan are as follows:

	Tons.
Arlington	460
Enterprise	60
Two Friends	40
Black Prince	20
Bondholder	20
Total	600

Following are the ore shipments received at the Trail smelter from different shipping mines for the week ending February 9:

	Tons.
Center Star	1,696
War Eagle	728
Iron Mask	139
Spitzee	16
B. C	722
Minnesota	19
Payne	61
Ivanhoe	20
Bosun	20
Sullivan	277
Ymir	56
Total	3,757

The Tin Cup M. & S. Co. of New York, which recently bought the Tin Cup, in Burnt Basin district, near Gladstone, will push work on the property this spring; G. K. Stocker, general manager, Cascade City.——During the week ending Feb. 16 shipments of ore from Rossland were 5957 tons, as follows:

	Tons.
Le Roi	2,364
Center Star	2,160
War Eagle	1,020
Iron Mask	113
Le Roi No. 2	200
Velvet	100
Total	5,957

MEXICO.

A new body of high-grade gold ore is reported opened up in the Creston, at Minas Prietas, Sonora.——A new electric lighting plant is going in at the Zabiate, near Sonora.——A strike of rich ore is reported made near the Verde, at La Colorado.——At Sahuaripa, the tunnel in the Tegeda has reached the old workings and has drawn off the water; A. C. Wright, Supt.——The deal for the sale of the Dewey and Esmeralda de Dewey mines, near Willard Station, on the Sonora railway, to Eastern men, is closed, price paid being $100,000.

A. L. Waters, Supt. British G. M. Co., Ltd., states that the smelting plant on its property near Matape, Sonora, is completed and the outlook good.

The Sonora Dev. Co. of Kansas City, Mo., has bought sixty-four acres of copper land near Nacosari, Sonora, besides the extension of the Churunbabi, known as the Conforme, in Montezuma district, Sonora, and others.

NEW ZEALAND.

At Oreville, on Great Barrier island, the Barrier Reefs Co., manager, A. S. Howe, has a 2100-foot tramway running from the lowest level of the mines to the ore bins; latter have a capacity of 1200 tons; No. 3 level is extended 400 feet and No. 1 level is in 600 feet; Gates stone breakers are used; twenty 1100-pound stamps are dropping; vanners in use were supplied by the Union Iron Works of San Francisco, Cal.; cyanide plant consists of two large slime vats, four settlers and three percolating vats; power at the mill is supplied by a 125 H. P. engine; mill is lighted by electricity; 1758 tons of ore recently crushed returned 2090 ounces of bullion, valued at £2024 9s 6d (about $9859.15), and 59 tons 12 cwt. of concentrates, worth £3552 14s 3d (about $17,301.65); total, £5577 35s 9d ($27,160.80).

The last clean-up for 1900 at the Waihi, in the Waihi district, near Auckland, from a crushing of 6394 tons of ore, yielded £20,335 ($99,031.45).——The main shaft in the Grand Junction, same district, is down 600 feet, and drifting will be begun at that depth.——The Waihi Extended shaft is down 200 feet.

Personal.

J. A. CORAM, of Lowell, Mass., is in Salt Lake, Utah.

T. LAIRD is now Supt. the Duchess, Angels, Cal., vice P. Maul.

J. FARRELL, formerly of Tombstone, Ariz., goes to South Africa.

H. F. BROWN has returned to San Francisco from British Columbia.

J. H. BELL is Supt. Bennett mine, Bennett's camp, Sombrero Butte, Ariz.

R. H. POSTLETHWAITE has returned to San Francisco from Shasta Co., Cal.

E. L. REDDING, Asst. Mgr. Duplex M. Co., Walsenburg, Colo., is in Chicago, Ill.

J. T. HAWKINS is now Supt. Comanche Plume Co.'s property, Cripple Creek, Colo.

J. W. DEANE, general manager Yavapai Copper Co., Prescott, Ariz., is in Denver, Colo.

F. THOMAS of the Slap Jack, Jacksonville, Cal., has returned there from San Francisco.

R. H. TERHUNE, Pres. New State Smelting & Refining Co., Salt Lake, Utah, has resigned.

D. R. OLIVER has returned to San Francisco from the Zubiate, near Minas Prietas, Sonora, Mexico.

W. DAVEY, of Philipsburg, Mont., goes to Leadville, Colo., as Supt. of Mines for the New Elkhorn M. Co.

A. B. W. HODGES, Supt. Granby Smelter, Grand Forks, B. C., goes to Chicago, Ill., and from there to Milwaukee, Wis.

SUPT. SILVER of the Zubiate, 15 miles from Minas Prietas, Sonora, Mexico, has resigned and will return to California; S. H. Oliver succeeds him.

Commercial Paragraphs.

THE American Steel & Wire Co. has issued a list of its products, infinite in variety, range and extent of production. The pamphlet may be obtained from any of the company's agencies.

THE Atlas Pipe Wrench Co., of New York and San Francisco, say that the increasing demand has compelled them to increase their facilities, and they are now ready to deliver wrenches in any quantity, and can hereafter promise immediate delivery.

THE Clot & Crist Machine Co.'s new works at 137–139 Beale street, San Francisco, is fully equipped with new modern shop tools and machinery for building and repairing steam engines, pumps, etc. Messrs. Clot & Crist are accounted experts, having had long and varied experience with all kinds of pumping machinery.

Books Received.

The chemistry of the cyanide process is superbly treated in a monograph by Prof. S. B. Christy, Dean of the College of Mining, University of California, Berkeley, Cal., entitled "The Electromotive Force of Metals in Cyanide Solutions," an elaborate and exhaustive treatise, giving the derivation and development of the theory and practice of electro-chemical action pertaining thereto, detailed description of the experimental work on that subject and full account of the methods by which such investigation was conducted. The work has additional value in the diagrams and other illustrations, and adds to the fame of the author, whose former treatises on the same general subject have had so deservedly wide a circulation.

Recently Declared Mining Dividends.

	Payable.
Home M. Co., Colorado, 25 cents per share, $12,500	Feb. 15
Gwin Mine Development Co., California, 10 cents per share, $10,000; total amount, $176,500	Feb. 19
Lightner M. Co., California, 2½ cents per share, $2625	Feb. 20
Gold Coin M. Co., Colo., 4 cents per share, $40,000	Feb. 25
Con. M. Co., Colo., 1 cent per share, $10,000	Feb. 25
Bull Hill Con. M. Co., Colo., 1 cent per share, $15,000	Feb. 25

List of U. S. Patents for Pacific Coast Inventors.

REPORTED BY DEWEY, STRONG & CO., PIONEER PATENT SOLICITORS FOR PACIFIC COAST.

FOR WEEK ENDING FEBRUARY 12, 1901

667,757.—CATTLE GUARD—W. R. Allen, Hoquiam, Wash.
667,758.—NUT LOCK—W. R. Allen, Hoquiam, Wash.
668,081.—LUBRICATOR—P. Bartlett, Spokane, Wash.
668,084.—ANIMAL TRAP—C. C. Bowen, Santa Monica, Cal.
668,085.—ANIMAL TRAP—C. C. Bowen, Santa Monica, Cal.
667,969.—ASSAYING DEVICE—A. Campbell, Surf, Cal.
667,840.—RESPIRATOR—S. Guthrie, S. F.
667,700.—SPIKE—T. J. W. Hicks, Prescott, Ariz.
668,102.—MOP WRINGER—J. H. Johnson, Silverton, Or.
667,943.—CURTAIN HANGERS—E. F. Kaiser, Fresno, Cal.
667,785.—COMPASS—A. Lietz, S. F.
667,786.—COMPOSITION OF MATTER—F. A. Lobert, National City, Cal.
667,923.—CORSET—Lida S. Reed, Bakersfield, Cal.
667,833.—POLE SOCKET—C. Vanarsdall, Enumclaw, Wash.
667,755.—CRATE—W. H. Wright, San Jose, Cal.
667,756.—GAS CUT-OFF—R. Wynall, S. F.

Notices of Recent Patents.

Among the patents recently obtained through Dewey, Strong & Co.'s SCIENTIFIC PRESS U. S. and Foreign Patent Agency, the following are worthy of special mention:

RESPIRATOR. — No. 667,840. Feb. 12, 1901. Samuel Guthrie, San Francisco, Cal.

The object of this invention is to provide an apparatus which is especially designed for the protection of operatives working in places where they are subject to foul gases, to smoke in case of fires, and generally for protection against asphyxiation from any cause. It consists of a two-part mask, fitting the mouth, nose and eyes of the wearer; an expansible bag carried upon the person, a pipe connecting the bag with the mouth and nose section, a second pipe connecting with the eye section, and means for charging the bag from a distant point.

GAS CUT-OFF.—No. 667,756. Feb. 12, 1901. Robert Wynell, San Francisco, Cal.

This invention relates to improvements in chandeliers by which certain of the burners may be raised or lowered with relation to the supply pipe, and a tight joint made at the gas inlet into the burner tubes. It consists of a main vertical supply pipe, with one or more parallel tubes supported therefrom, pipes slidable in said tubes and having burners connected therewith, holders at the lower ends of the tubes, and cock-controlled gas connections with the main pipe. There are holes in the slidable pipes, and stops to limit the movement of these pipes, so as to register the holes in them with the openings from the supply pipe. Surfaces are provided fitting the pipes, through which communication to the burners is made, and means for locking the pipe in position.

Latest Market Reports.

SAN FRANCISCO, Feb. 21, 1901.

SILVER—Per oz., Troy: London, 28⅛d (standard ounce, 925 fine); New York, bar silver, 61½c (1000 fine); San Francisco, 61½c; Mexican dollars, 50c.

COPPER.—New York: Lake, 1 to 3 casks, $17.00; carload lots, 16.75; Electrolytic, 1 to 3 casks, 16.75; carload lots, 16.50; Casting, 1 to 3 casks, 16.60; carload lots, 16.35. San Francisco: 18. Mill copper plates, 20c; bars, 22@23c.

LEAD.—New York, $4.37½; Salt Lake City, $4.00; St. Louis, $4.20; Missouri lead, $4.32½ desilverized lead; San Francisco $5.00, carload lots; 5½c 1000 to 4000 lbs.; pipe 6¾, sheet 7½, bar 6c; pig, $4.70 @5.10. London, £15 per ton—3.26 cts. per lb.

SPELTER. — New York, $4.10; St. Louis, $3.75; London, £17 12s 6d per ton 3.82½ cts. per ℔; San Francisco, ton lots, 5½c; 100-lb lots, 6c.

ANTIMONY.—New York, Cookson's, 10c; Hallett's, 9½c; San Francisco, 1000-lb lots, 12c; 300 to 500 lbs., 13@14c; 100-lb lots, 15@18c.

IRON.—Pittsburg, Bessemer pig, $13.50; gray forge, $13.30; San Francisco, bar, per lb., 2.65c in small quantities.

STEEL.—Bessemer billets, Pittsburg, $21.00; open hearth billets, $21.50; San Francisco, bar, 7c to 12c per lb.

TIN.—New York, pig, $26.95; San Francisco, ton lots, 29c; 1000 lbs., 29½c; 500 lbs., 29½c; less, 30c; bar tin, ₱ ℔, 35c.

QUICKSILVER. — New York, $51.00 large lots; London, £9 2s 6d; San Francisco, local, $48.00 ₱ flask of 76½ lbs.; Export, $44. 50

MAGNESIUM.—New York, $2.90 ₱ ℔.; San Francisco, $3.75.

ZINC.—San Francisco, 5½c; slab, 5¾c; bar, 7c; zinc dust, N. Y., 8c.

BABBITT METAL.— San Francisco, No. 1, 10c.

SOLDER. — Half-and-half, 100-℔. lots, 18½c; San Francisco, Plumbers', 100-℔. lots, 15½c.

ASSAY LITHARGE.—San Francisco, 10c ₱ ℔, small lots.

BISMUTH.—New York, ₱ ℔., $2.25 50-℔ lots; San Francisco, $2.50 to $2.75 ℔ lots.

PLATINUM.—San Francisco, crude, $17 ₱ oz.; New York, $18.20 per Troy oz

ALUMINUM.—New York, No. 1, 99% pure ingots, 35c; No. 2, 90%, 30c to 35c.

FERRO-MANGANESE. — Pittsburg, 80%, domestic, $62.50, large lots.

PHOSPHORUS.—F. o. b. New York 50@60c ₱ ℔.

POWDER.—F. o. b. San Francisco: No 1. 70% nitro-glycerine, per ℔., in carload lots, 15½c; less than one ton, 17½c. No. 1*, 60%, carload lots, 13½c; less than one ton, 15½c. No. 1** 50%, carload lots, 11½c; less than one ton, 13½c. No. 2, 40%, carload lots, 10c; less than one ton, 12c. No. 2* 35%, carload lots, 9½c; less than one ton, 11½c. No. 2** 30% carload lots, 9c; less than one ton, 11c. Black blasting powder in carload lots, minimum car 728 kegs, $1.50 per keg; less car lots, $2 per keg.

CAPS.—3x, $5.50 per 1000; 4x, $6.50; 5x, $8; Lion, $9, in lots not less than 1000.

FUSE.—Triple tape, $3.60 per 1000 feet; double tape, $3.00; single tape, $2.65; Hemp, $2.10; Cement No. 2, $3.00; Cement No. 1, $2.65, in lots of 3000 feet and up.

CANDLES.—Granite 6s, 16 oz., 40s., 11½c ₱ set; 14 oz., 40s., 10c.

CHEMICALS.—Cyanide of potassium, 98%-99%, jobbing, 32½@33½c ₱ ℔.; carloads, 30@31c; in 10-℔. tins, 40c; sulphuric acid, in carboys, 66% B, 2c ₱ ℔.; soda ash, $1.90 ₱ 100 ℔s. 58%; hyposulphite of soda, 2¾@3c ₱ ℔.; blue vitriol, 5¾@6½c ₱ ℔.; borax, concentrated, 7@8c ₱ ℔.; chlorate of potash, 12@13c; roll sulphur, 6c; alum, $1.90@2.00; flour sulphur, French, 2½@2½c; California refined, 1¾@2c; nitric acid, in carboys, 8c ₱ ℔.; caustic soda, in drums, 3@4c ₱ ℔.; Cal. s. soda, bbls., $1.00; sks, 95c ₱ 100 ℔s.; chloride of lime, spot, $2.50@2.60; nitrate of potash, in kegs, 8c; caustic potash, 10c in 40-℔. tins.

COPPER: Do you know that of $52,000,000 dividends declared by listed mining companies last year the copper mines paid $33,000,000? Arizona is the richest copper country on earth and affords the greatest opportunities for the profitable investment of capital. The ARIZONA SILVER BELT, the leading weekly newspaper, gives the reliable mining news; published at Globe, Arizona; $2.50 per year. Write for sample copy.

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PRACTICAL MINER and TOOL SHARPENER, fifteen years' experience in the United States and British Columbia, would like a position. Address "D," care of this paper.

SITUATION WANTED by a young man who is a practical miner; understands cyanide work and is a good assayer; would like to take charge of small cyanide plant or as assistant in a large one. Good references. Address D. W., this office.

WANTED—A position as superintendent for a mining company by a man of 16 years' practical mining experience; understands mining and milling (amalgamation, concentration and leaching); good assayer and accountant; would accept a subordinate position if good; references. Address "Advertiser," 1225 Webster St., Oakland, Cal.

CHEMIST AND ASSAYER, with experience in draughting, bookkeeping and typewriting, desires position as assayer or assayer and bookkeeper in mine or as secretary to mining engineer or mine official. Has fair literary and scientific education. Experience in the preparation of reports, prospectuses and catalogues. Excellent moral character and good health. For further particulars, address E. R. M., care Mining and Scientific Press.

Mining Engineer, technical graduate, with nine years' practical experience, wishes position as manager or superintendent of mining or milling proposition. Thoroughly competent and reliable, best of references. Understands draughting, buying machinery, erecting, operating. Experience with all chemical processes, cyanide expert. Speaks Spanish, familiar with Mexico, prefer position in the U. S. Address Box 25, this office.

Situation Wanted by Mining Engineer of 20 years' experience in California, Colorado, Mexico and Germany. Has had charge of large properties—gold, silver, lead, copper, sulphur and oil. College graduate; good assayer, surveyor and accountant; speaks Spanish. Has experience in railroad construction and road building. Formerly U. S. deputy mineral surveyor and member of geological field force. Will go anywhere. Address P. M., Mining and Scientific Press.

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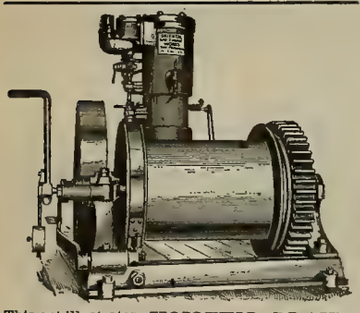

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Larger sizes built to suit the demands of our customers.
It is strong and exceedingly simple and durable, being entirely under the control of the operator, by the use of a single hand lever for hoisting, while the lowering is governed by a foot lever and brake.
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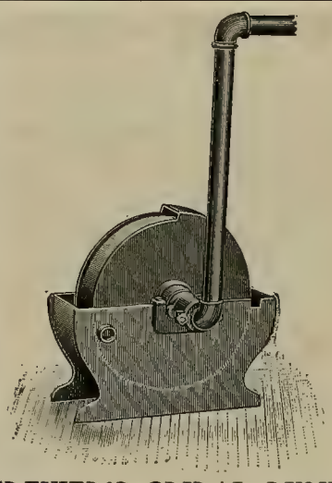

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The Regular Annual Meeting of the Stockholders of the SPANISH CONS. QUARTZ MINING COMPANY will be held at the office of the Company, 113-114 Crocker Building, San Francisco, California, on WEDNESDAY, the 13th day of March, 1901, at the hour of 2 o'clock P. M., for the purpose of electing a Board of Directors to serve for the ensuing year, and the transaction of such other business as may come before the Meeting.
Transfer Books will close on SATURDAY, March 2, 1901, at 12 o'clock noon.
B. N. SHOECRAFT, Secretary.
Office—113-114 Crocker Building, San Francisco, California.

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Seem to possess almost human intelligence. They respond to every requirement in a smooth, positive fashion that shows what a perfect telephone can do. Besides this they have unequalled strength and durability. Their reputation as "STANDARD OF THE WORLD" is built on merit. Is the best too good for you?
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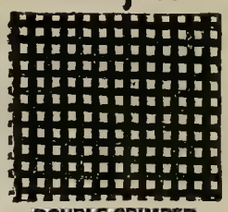
"The Perfect" USE "THE PERFECT"



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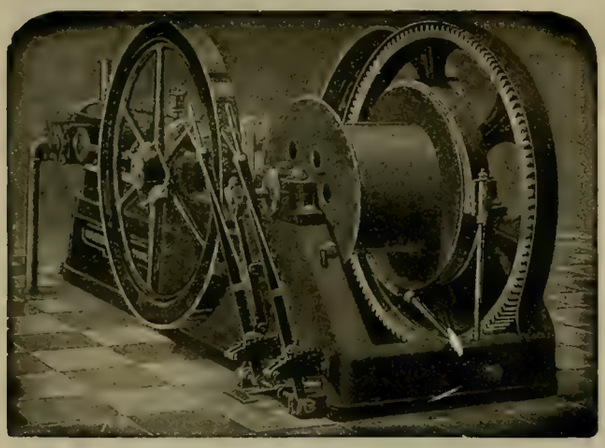

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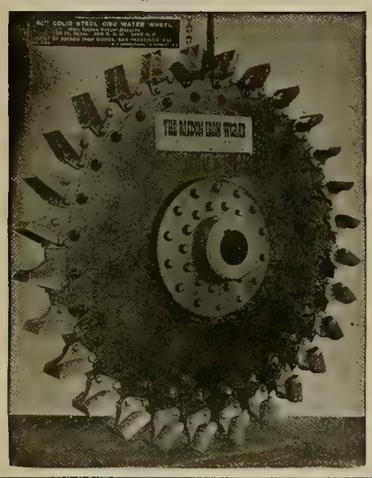

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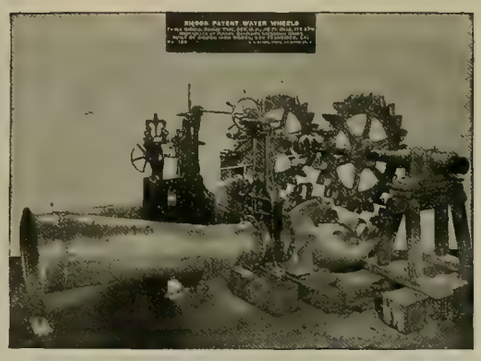
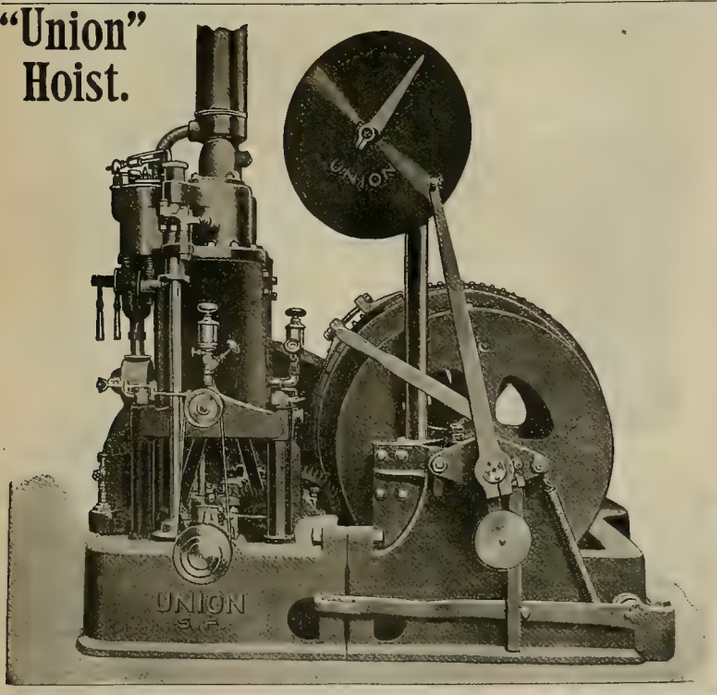


"Union" Hoist.



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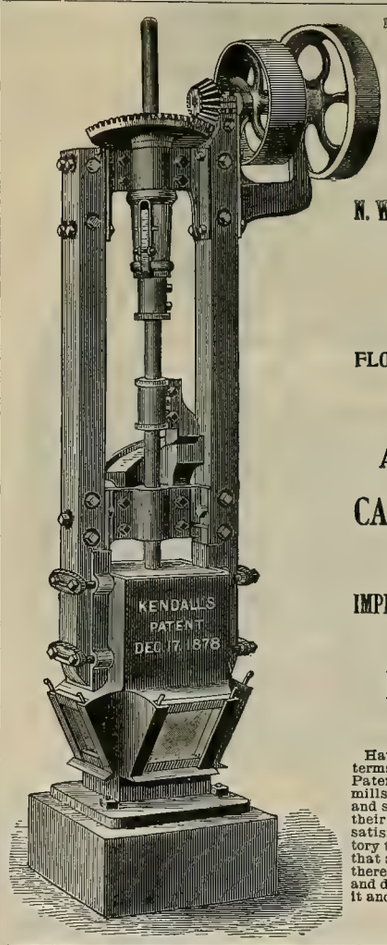

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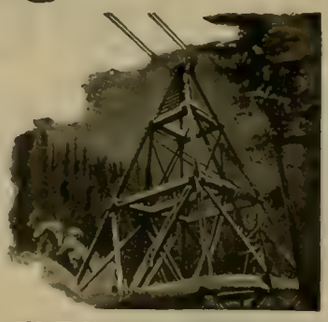

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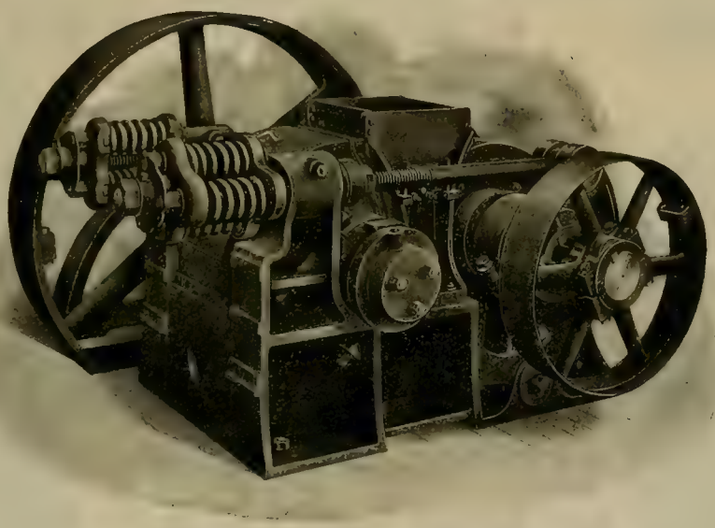

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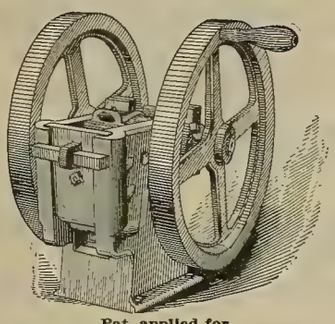

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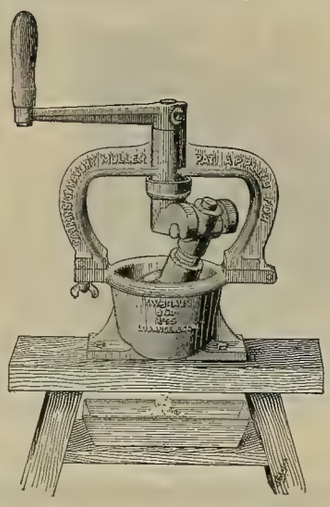

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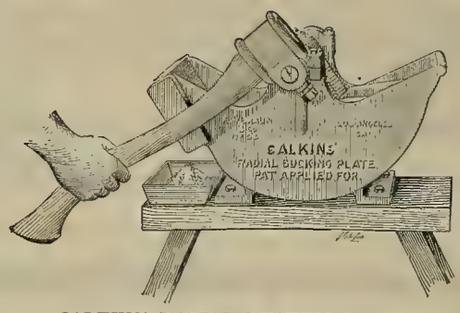

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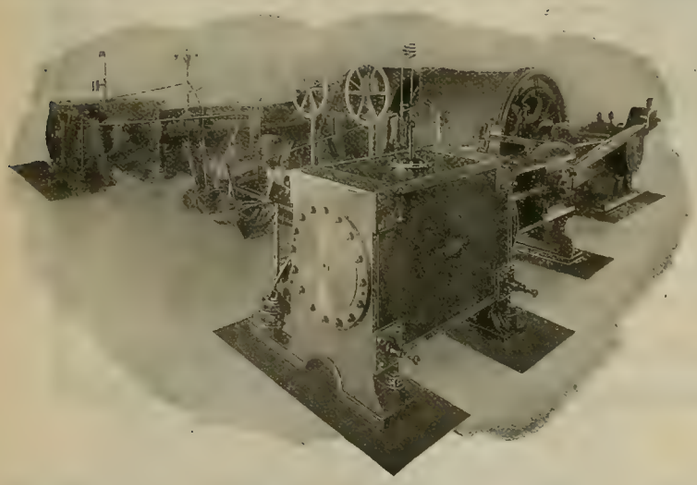

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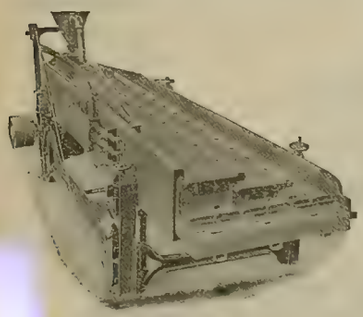

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All parts are interchangeable.

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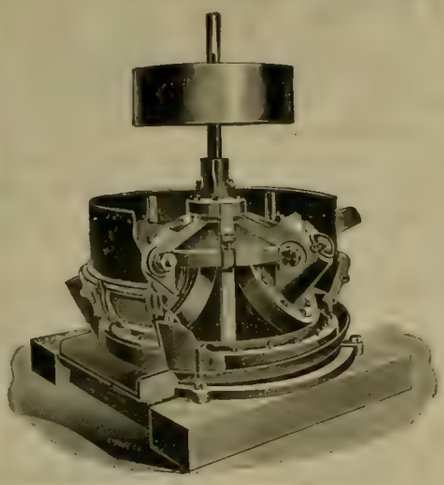

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THREE ROLLER
ORE MILL.

The Griffin Three Roller Ore Mill is a simply constructed Mill, suitable for working all kinds of ores that require uniformly fine crushing by the wet process. This Mill is a modification of the well-known Chilian Mill, but the rollers run upon a crushing ring or die, which is inclined inwardly at an angle of about 30 degrees, the rollers themselves also being inclined to the central shaft of the Mill, thus utilizing the centrifugal force, as well as the weight of the rollers themselves as a crushing agent. The Griffin Three Roller Ore Mill is therefore a Mill of great strength, and has few wearing parts. We construct these Mills with extreme care, using only the best of raw materials, which are most carefully worked by men who are specialists as mill builders. We sell the Griffin Ore Mill on its determined merits, and will gladly supply full information regarding it to any one.

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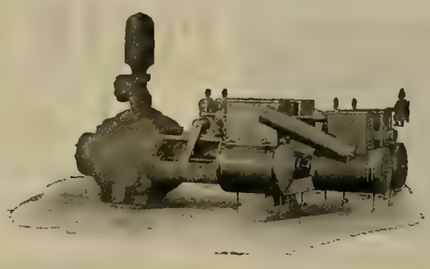

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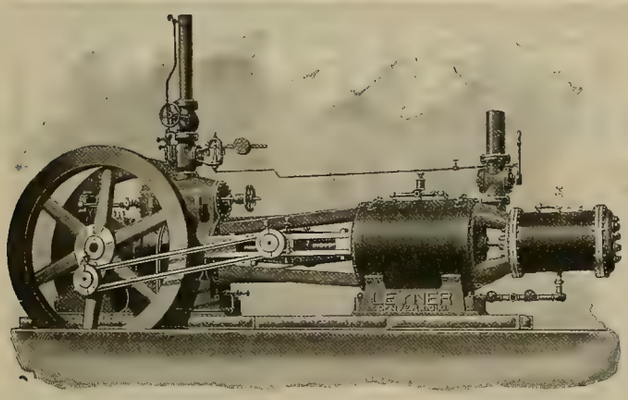

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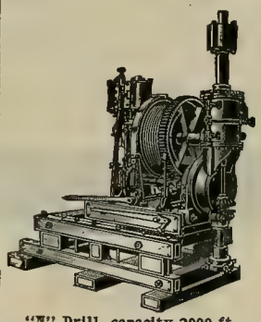

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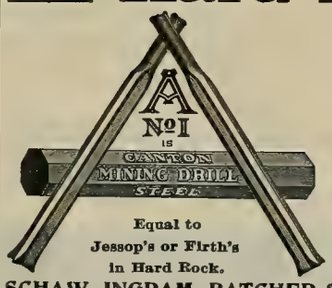

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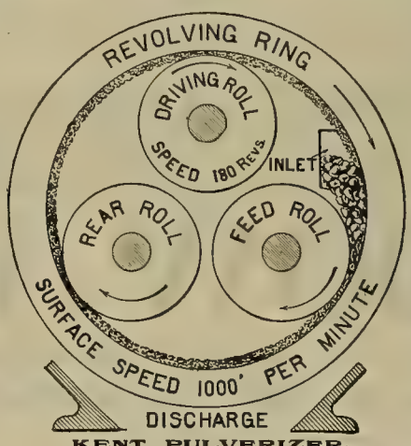

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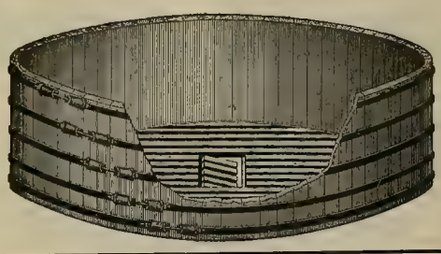

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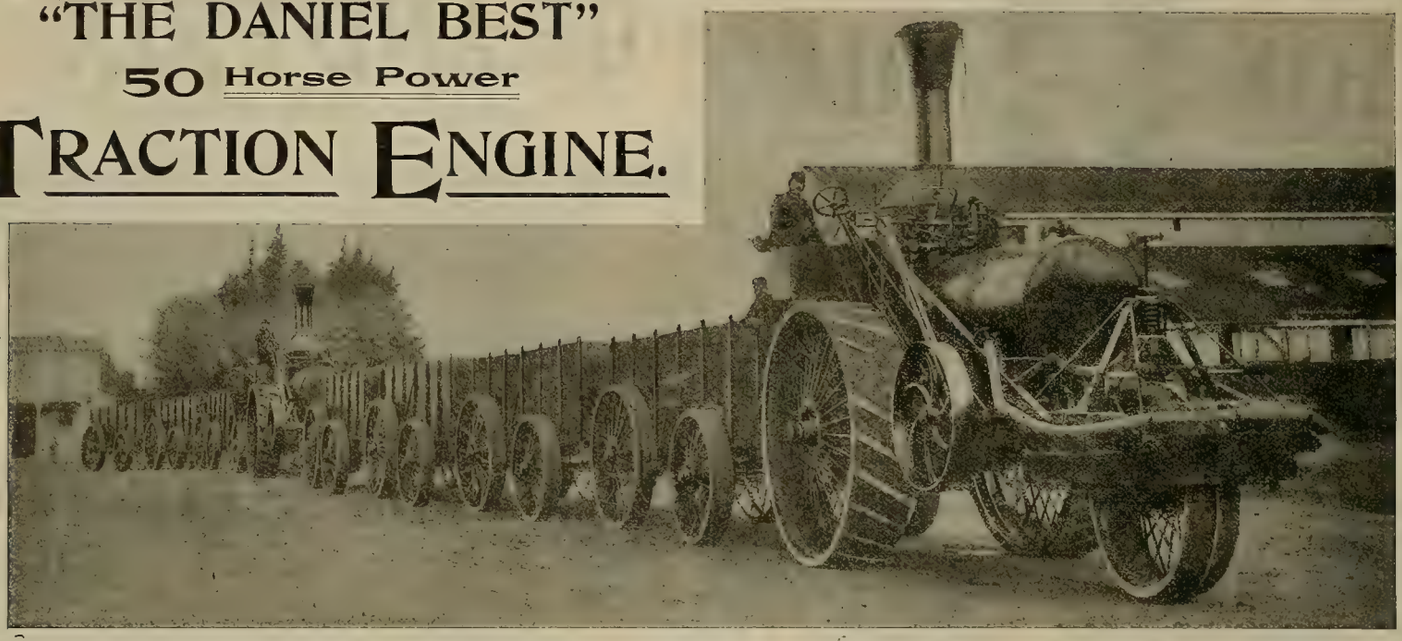

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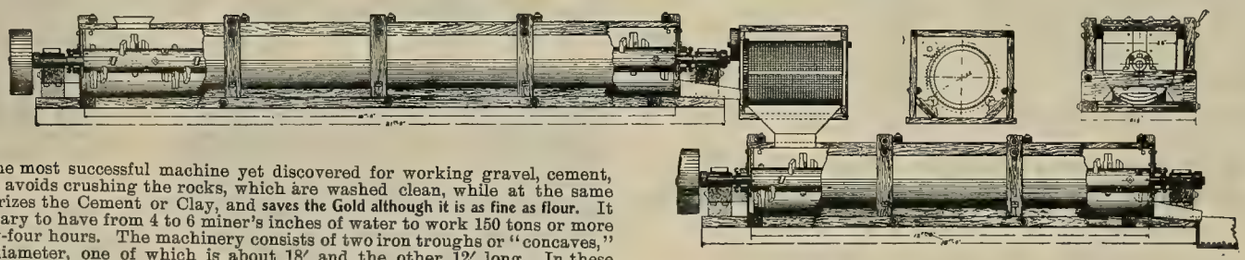

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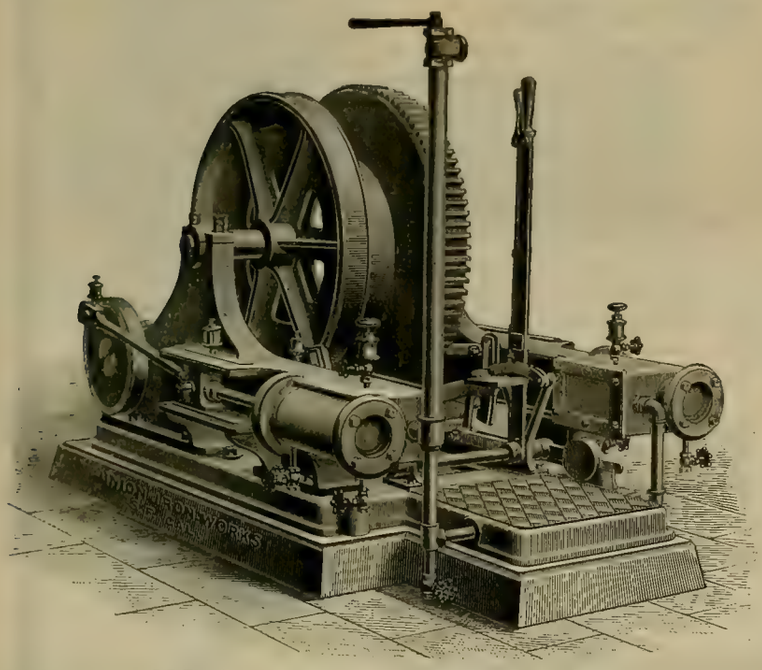

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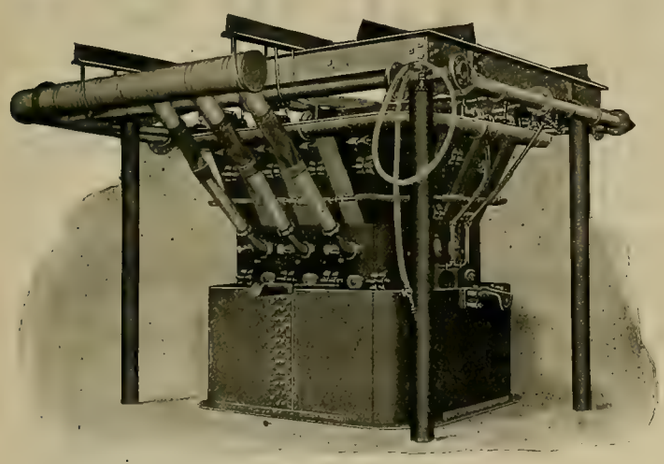

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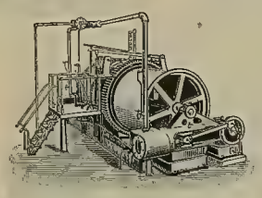

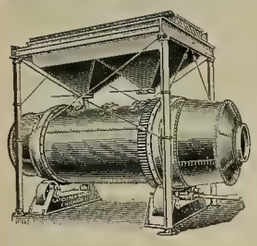

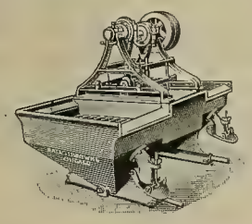

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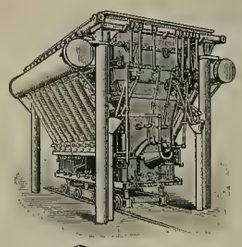

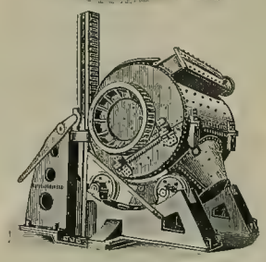

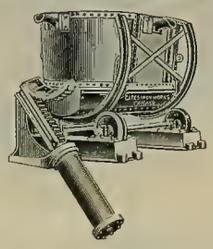

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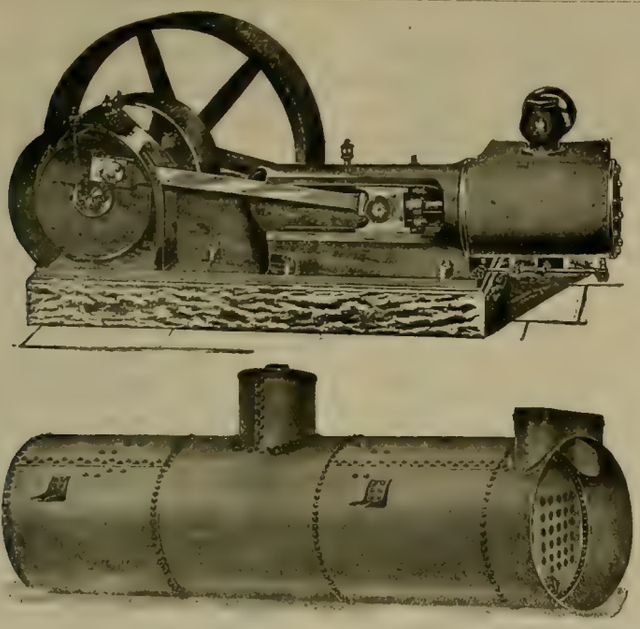

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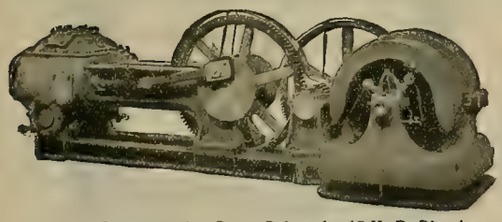

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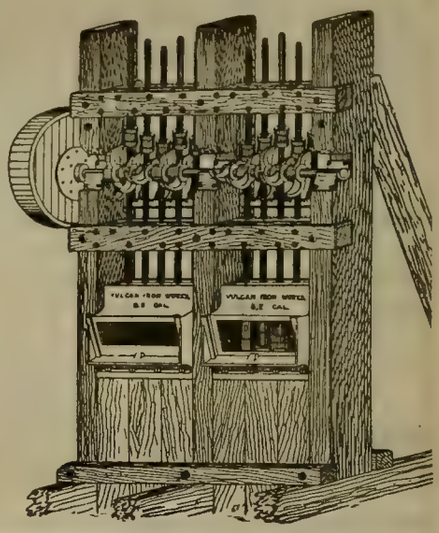

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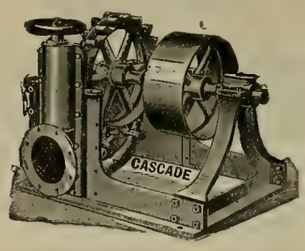

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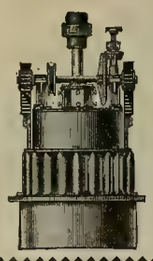

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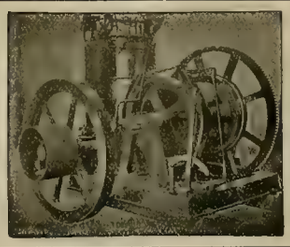

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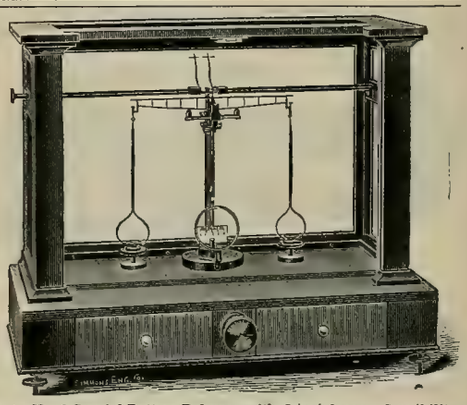

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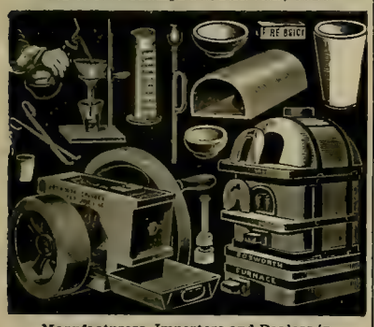

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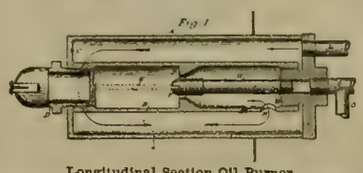

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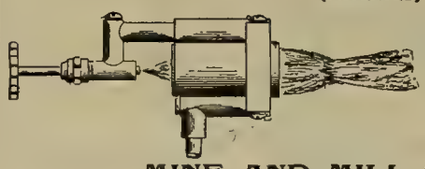

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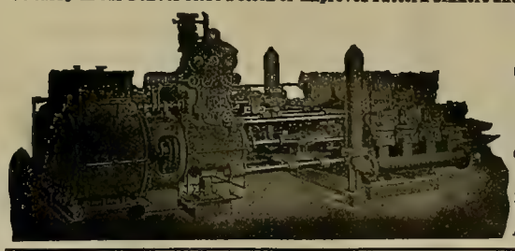

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"We have used Leviathan Belting for four years, up to 24-inch by 8-ply, elevating and conveying coal. Some of the Belting is outside, exposed to freezing weather; some in a steam bath. In both conditions the results have been very gratifying, over 500 tons having been handled in ten hours time."

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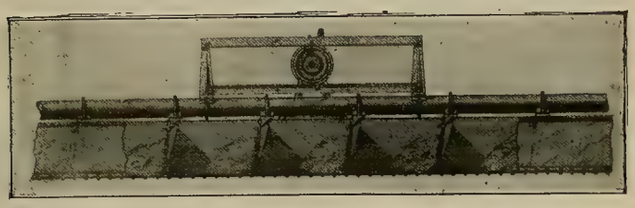
FOR TRANSPORTING QUARTZ, TAILINGS, SAND, ETC.



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PERFECT DISCHARGE ELEVATORS.
COMPLETE INSTALLATIONS.

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TELL US WHERE YOU'RE AT.

4 Cents Per Ton Per Mile

Is what it costs to transport Ore with our systems of Aerial Wire Rope Tramways.

We'd like to send you our book telling you all about it, but we can't do it unless you write us

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are now supplanting

SORTING TABLES

of wood and iron.

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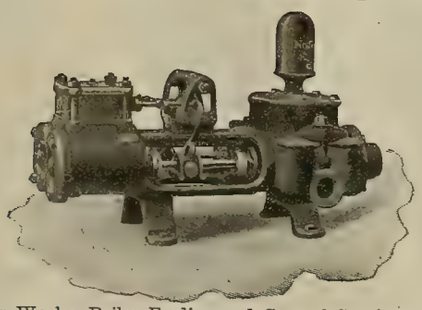
Made in 26 Sizes.



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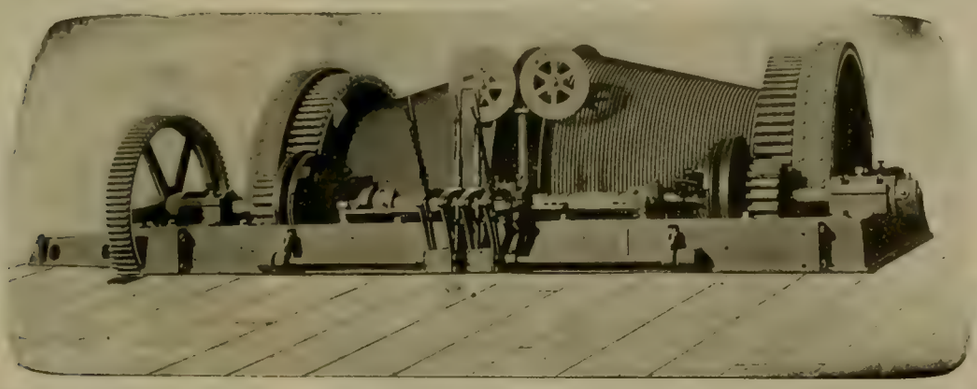
IN SUCCESSFUL OPERATION. Send for Bulletin No. 1003.



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Three of These Built for the British-American Corporation, Ltd., Rossland, B. C.

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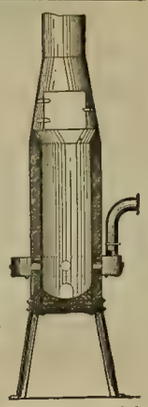

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New Process Raw Hide Gears not only do away with the noise; they also reduce vibration and prolong the life of the metal wheels with which they mesh. Another feature of importance in many instances is that they are cleanly, no lubricant being needed.

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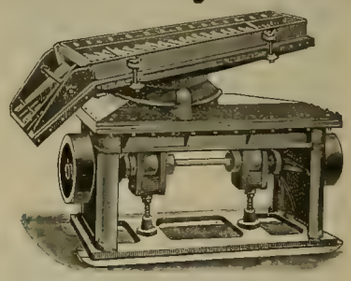

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SAMPLE LOTS TREATED FREE.

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is the only reliable method of treating mixed, slimy or rebellious ores. Zinc and lead combinations handled in good shape where all other processes had failed

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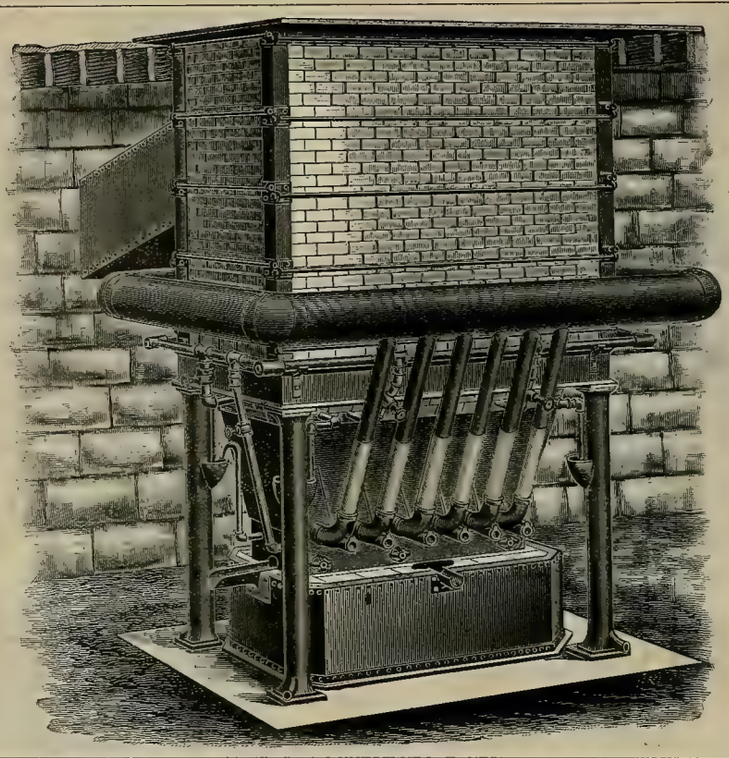

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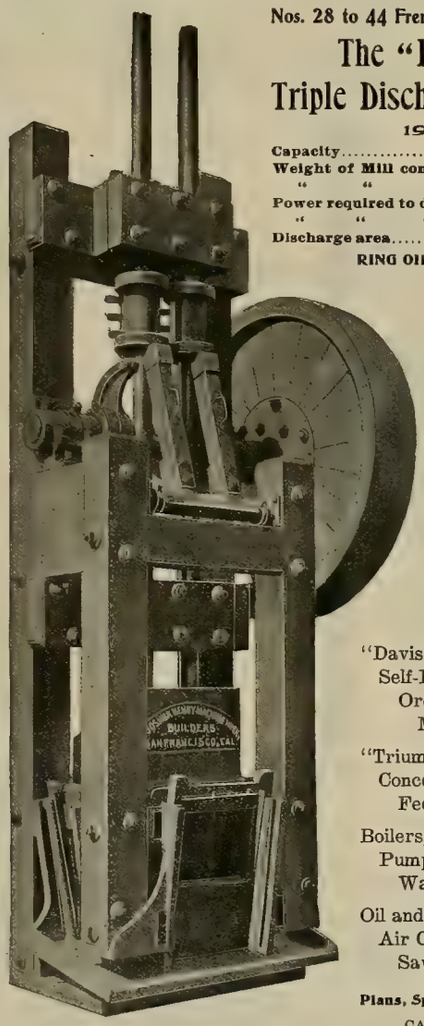

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Weight of Mill complete with 850-lb. stamps, 8300 lbs.
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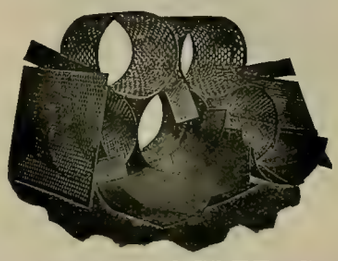

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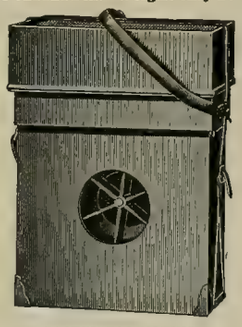

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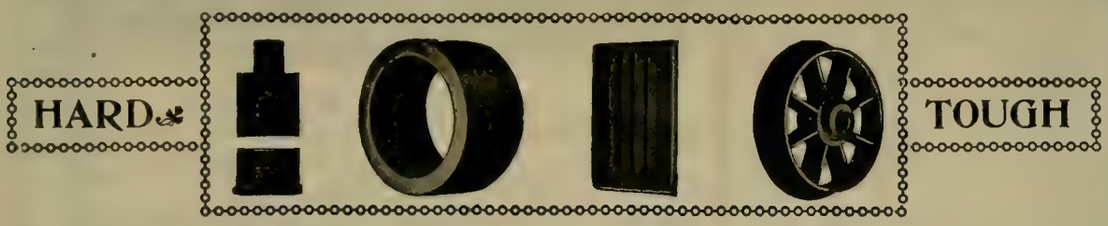

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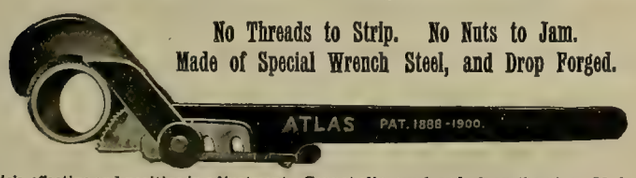

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ASSESSMENT NOTICES.

ALLIANCE EXPLORATION & MINING COMPANY.—Location of principal place of business, San Francisco, California; location of works, Ophir, Placer County, California.

Notice is hereby given, that at a meeting of the Board of Directors, held on the 12th day of February, 1901, an assessment (No. 3) of two (2) cents per share was levied upon the capital stock of the corporation, payable immediately in United States gold coin, to the secretary, at the office of the company, 236 Sutter street, San Francisco, California.

Any stock upon which this assessment shall remain unpaid on the 18th day of March, 1901, will be delinquent, and advertised for sale at public auction; and unless payment is made before, will be sold on MONDAY, the 8th day of April, 1901, to pay the delinquent assessment, together with the costs of advertising and expenses of sale.

By order of the Board of Directors.

S. GOLDSMITH, Secretary.

Office—236 Sutter street, San Francisco, California.

MARIPOSA COMMERCIAL AND MINING COMPANY.—Location of principal place of business, San Francisco, California; location of works, Mariposa County, California.

Notice is hereby given, that at a meeting of the Board of Directors, held on the 24th day of December, 1900, an assessment (No. 20) of Ten ($10) Dollars per share was levied upon the capital stock of the corporation, payable immediately in United States gold coin, to the secretary, at the office of the company, 320 Sansome street, room 24, San Francisco, California.

Any stock upon which this assessment shall remain unpaid on the 11th day of February, 1901, will be delinquent, and advertised for sale at public auction; and unless payment is made before, will be sold on SATURDAY, the 2nd day of March, 1901, to pay the delinquent assessment, together with the costs of advertising and expenses of sale.

By order of the Board of Directors.

JOSEPH H. MOOSER, Secretary.

Office—320 Sansome street, room 24, San Francisco, California.

LARKIN MINING COMPANY.—Location of principal place of business, San Francisco, California; location of works, El Dorado County, California.

Notice is hereby given, that at a meeting of the Board of Directors, held on the 18th day of January, 1901, an assessment (No. 9) of two (2) cents per share was levied upon the capital stock of the corporation, payable immediately in United States gold coin, to the secretary, at the office of the company, 112 Main street, San Francisco, California.

Any stock upon which this assessment shall remain unpaid on the 25th day of February, 1901, will be delinquent and advertised for sale at public auction; and unless payment is made before, will be sold on MONDAY, the 18th day of March, 1901, to pay the delinquent assessment, together with the costs of advertising and expenses of sale.

By order of the Board of Directors.

N. F. REMINGTON, Secretary.

Office—112 Main street, San Francisco, California.

SPANISH CONS. QUARTZ MINING COMPANY.—Location of principal place of business, San Francisco, California; location of works, Nevada County, California.

Notice is hereby given, that at a meeting of the Board of Directors, held on the 12th day of February, 1901, an assessment (No. 4) of five (5) cents per share was levied upon the capital stock of the corporation, payable immediately in United States gold coin, to the secretary, at the office of the company, 113 Crocker Building, San Francisco, California.

Any stock upon which this assessment shall remain unpaid on the 19th day of March, 1901, will be delinquent, and advertised for sale at public auction; and unless payment is made before, will be sold on MONDAY, the 8th day of April, 1901, to pay the delinquent assessment, together with costs of advertising and expenses of sale.

By order of the Board of Directors.

B. N. SHOECRAFT, Secretary.

Office—113 Crocker Building, San Francisco, California.

DELINQUENT SALE NOTICE.

TANANA MINING COMPANY.—Location of principal place of business, San Francisco, California.

Notice.—There are delinquent upon the following described stock on account of assessment (No. 2) levied on the 20th day of December, 1900, the several amounts set opposite the names of the respective shareholders, as follows:

	No. cert.	No. shares.	Amt.
Arthur H. Ten Broeck	10	250	25 00
W. C. Price	15	250	25 00

And in accordance with law, and an order from the Board of Directors, made on the 20th day of December, 1900, so many shares of each parcel of such stock as may be necessary will be sold at public auction at the office of the secretary, Edward H. Stearns, at Room 801, Claus Spreckels Building, at the corner of Third and Market streets, San Francisco, California, on WEDNESDAY, the 6th day of March, 1901, at the hour of 12 o'clock M. of said day, to pay said delinquent assessment thereon, together with costs of advertising and expenses of sale.

EDWARD H. STEARNS, Secretary.

Office—Room 801, Claus Spreckels Building, Cor. Third and Market Sts., San Francisco, California.

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DELINQUENT SALE NOTICE.

AMERICAN OIL AND REFINERY COMPANY.—Location of principal place of business, San Francisco, California. Location of works, Contra Costa County, California.

NOTICE.—There are delinquent upon the following described stock, on account of assessment (No. 2) levied on the 26th day of November, 1900, the several amounts set opposite the names of the respective shareholders, as follows:

Names.	No. Cert.	No. Shares.	Amt.
Abbott, William	720	50	$2 50
Abbott, William	721	50	2 50
Abbott, William	722	50	2 50
Abbott, William	723	25	1 25
Abbott, William	734	25	1 25
Anthony, J. C., Trustee	797	1,000	50 00
Anthony, J. C., Trustee	798	1,000	50 00
Anthony, J. C., Trustee	799	1,000	50 00
Anthony, J. C., Trustee	973	1,000	50 00
Anthony, J. C., Trustee	1021	4 300	215 00
Dignan, J. P.	1039	1,000	50 00
French, Mrs. Mary L.	385	2	10
Goodenough, S.	1046	380	19 00
Holbrook, W. E., Trustee	897	10 000	500 00
Holbrook, W. E., Trustee	898	11,000	550 00
Holbrook, W. E., Trustee	899	4 500	225 00
Holbrook, W. E., Trustee	900	4,500	225 00
Kielhofer, Mrs. Louis	298	2	10
Kraehmer, Louis L.	471	3	15
Laird, Mrs. L. N.	230	5	25
Lord, Mrs. Leona E.	327	2,000	100 00
Lucas, Mrs. T. R.	848	10	50
Mayer, Mrs. L.	406	800	40 00
Massey, James B.	914	1	05
McKelvey, Mrs Angelina	71	12	60
McAllister, H. L.	1071	100	5 00
Pope, Wm.	656	50	2 50
Pope, Wm.	695	20	1 00
Pope, Wm.	764	30	1 50
Pope, Wm	908	20	1 00
Raht, Julia F.	321	25	1 25
Raht, Julia F.	453	40	2 00
Rachel, Mrs. Eliza	856	400	20 00
Royce, Lizzie A.	441	5	25
Russell, G. E.	125	3	15
Stover, W. M.	1047	480	24 00
Truitt, J. J.	399	5	25
Walser, Mark	858	1,000	50 00
Walser, Mark	859	1,000	50 00
Walser, Mark	860	1,000	50 00
Walser, Mark	861	1,000	50 00
Walser, Mark	863	500	25 00
Walser, Mark	867	500	25 00
Walser, Mark	868	500	25 00
Walser, Mark	869	500	25 00
Walser, Mark	870	500	25 00
Walser, Mark	871	500	25 00
Walser, Mark	872	500	25 00
Walser, Mark	921	50	2 50
Walser, Mark	926	5,000	250 00
Walser, Mark	927	5,000	250 00
Walser, Mark, Trustee	596	500	25 00
Walker, Mrs. S. E. D. E.	375	120	6 00
Young, R.	761	328	16 40

And in accordance with law, and an order from the Board of Directors, made on the 26th day of November, 1900, so many shares of each parcel of such stock as may be necessary, will be sold at public auction at the office of said corporation, in Rooms 322-323 Parrott building, San Francisco, California, on MONDAY, the 28th day of January, 1901, at the hour of 1 o'clock P. M. of said day, to pay said delinquent assessment thereon, together with costs of advertising and expenses of sale.

J. C. ANTHONY, Secretary.

Office—Rooms 322-323, Parrott building, San Francisco, California.

POSTPONEMENT.

By order of the Board of Directors, the day of sale of the above delinquent stock has been postponed to MONDAY, the 11th day of February, 1901, at the hour of 1 o'clock P. M., at the office of said corporation in Rooms 322-323 Parrott building, San Francisco, California. J. C. ANTHONY, Secretary.

POSTPONEMENT.

By order of the Board of Directors, the day of sale of the above delinquent stock has been postponed to MONDAY, the 25th day of February, 1901, at the hour of 1 o'clock P. M., at the office of said corporation in Rooms 322-323 Parrott building, San Francisco, California. J. C. ANTHONY, Secretary.

DELINQUENT SALE NOTICE.

YUBA RIVER GOLD DREDGING COMPANY.—Location of principal place of business, San Francisco, California; location of works, Smartsville, Yuba County, California.

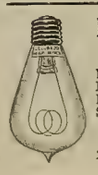
Notice.—There are delinquent upon the following described stock, on account of assessment (No. 2) levied on the 4th day of January, 1901, the several amounts set opposite the names of the respective shareholders, as follows:

Names.	No. Cert.	No. Shares.	Amt.
Henry Hilp	4	5	$0 15
Albert Moch	8	2,000	60 00
A. W. Goldsmith	9	2,000	60 00
H. L. Frank	14	1,000	30 00
H. L. Frank	15	1,000	30 00
H. L. Frank	16	1,000	30 00
H. L. Frank	17	1,000	30 00
H. L. Frank	18	1,000	30 00
H. L. Frank	19	1,000	30 00
H. L. Frank	20	1,000	30 00
H. L. Frank	21	1,000	30 00
H. L. Frank	22	1 000	30 00
Henry Hilp	28	500	15 00
M. E. Mayer	32	500	15 00
Hannah Heringhi, Trustee	33	300	9 00
S. Belasco, Trustee	34	200	6 00
Ed. Pelasco, Trustee	35	200	6 00
Sarah Mayer, Trustee	36	200	6 00
I. Belasco	37	250	7 50
S. Belasco	38	100	3 00
Rose Haas	39	200	6 00
E Heringhi, Trustee	40	200	6 00
Mark Thall	41	200	6 00
Louis Heringhi	48	100	3 00
Martin Freund	49	500	15 00
G. A. Kornberg	66	10,000	300 00
G. A. Kornberg	67	10,000	300 00
G. A. Kornberg	68	10,000	300 00
G. A. Kornberg	72	1,000	30 00
G. A. Kornberg	73	1,000	30 00

And in accordance with law, and an order from the Board of Directors, made on the 4th day of January, 1901, so many shares of each parcel of such stock as may be necessary, will be sold at public auction at the office of the company, Room 31, No. 214 Pine street, San Francisco, California, on TUESDAY, the 5th day of March, 1901, at the hour of 2 o'clock P. M. of said day, to pay said delinquent assessment thereon, together with costs of advertising and expenses of sale.

ALBERT CERF, Secretary.

Office—No. 214 Pine street, Room 31, San Francisco, California.



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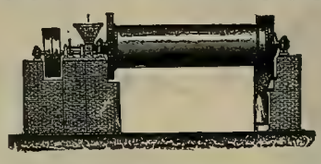

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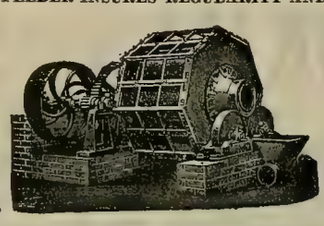

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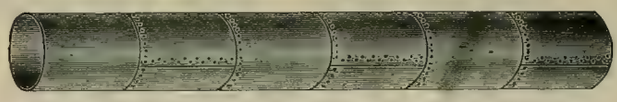

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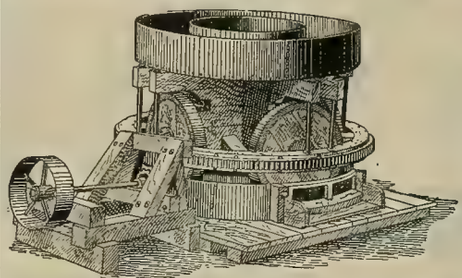

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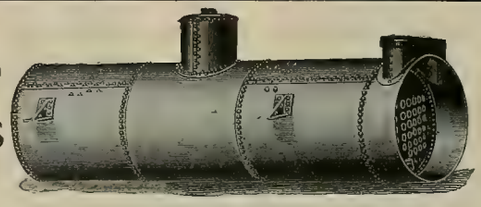

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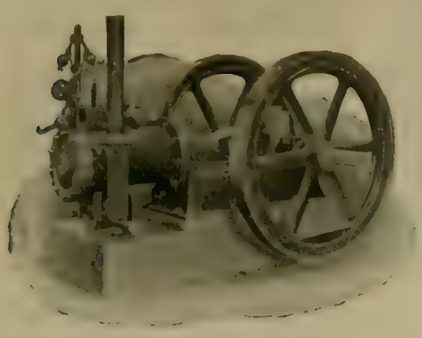

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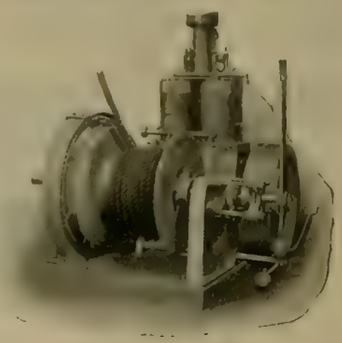

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Pumps sand and grit without injury to cylinder.

Seldom requires packing and is easily repacked.

Forces water on the down stroke so does not require balanced bob.

Water column and pump rod can be made to perfectly balance.

Each pump is provided with an automatic air valve which relieves pump of air taken in when suction gets out of water.

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of SUPERIOR quality and at prices 20 to 30% lower than any other maker.
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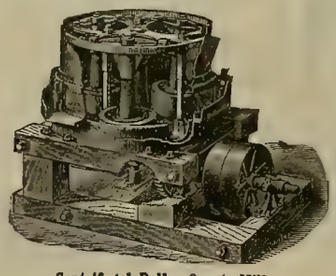

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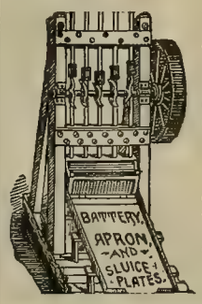

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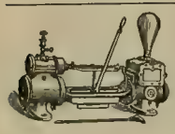

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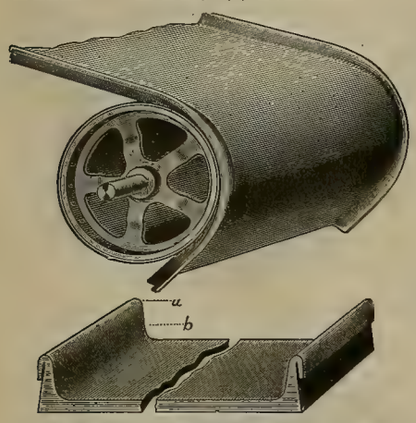

It has taken years of ceaseless testing and experimenting to produce the superior belt which we now offer, with elastic flanges and pliable body reinforced with specially woven duck. Every belt is manufactured by experienced workmen, and carefully tested on machines especially built for that purpose; consequently we are to-day manufacturing the best belts that mechanical ingenuity, combined with honesty of construction, can possibly produce.

RAWHIDE GOLD MINING COMPANY,
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J. S. BROWNELL, ESQ.—DEAR SIR: Replying to your query of Feb. 15th, will say that I have used your Patent Lip flange belt more than one year, and judging from their appearance after more than one year of hard service, I do not hesitate to say that they are the best belt I have ever used and I take great pleasure in testifying to the fact. Yours truly, W. A. NEVILLS, President.

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MR. J. S. BROWNELL—DEAR SIR: I take pleasure in saying that I have used your Patent Lipped flange belt for several years while connected with this company, and I consider them the best that we have used. The quality of rubber in the flange seems to be the best, and we are not bothered with the flange cracking and thereby destroying the life of the belt. At present we are using 14 concentrators, and have in use several kinds of belts. We consider your Patent Lipped flange the best. Yours very truly, THE CONS. SOUTH SPRING HILL G. M. CO.
By JOHN R. TREGLOAN, Superintendent.

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JAS. S. BROWNELL, Western Agent FRUE VANNING MACHINE CO.

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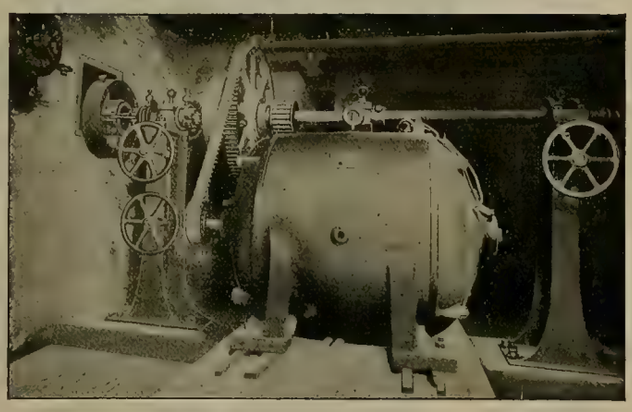

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WIRE TRAMWAYS (Single and Double Rope Systems),

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THE "JAMES" ORE FEEDER,

as illustrated on this page, is a machine of improved design for the automatic feeding of ores to stamp batteries and other crushing machinery. It is perfectly adjustable while in operation, and will feed equally well ores wet or dry, coarse or fine.

Shipping weight, with wood frame, - 800 pounds.
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ADVANTAGES

The advantages of this ore feeder, over any others that are in the market, are, that the feed is positive and will not gig back no matter how slight the motion to the arm; it can not possibly spill ore of any character and will definitely measure out from one to fifty tons per day of any class of ore.

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MINING AND SCIENTIFIC PRESS.

Whole No. 2119.—VOLUME LXXXII. Number 9. SAN FRANCISCO, SATURDAY, MARCH 2, 1901. THREE DOLLARS PER ANNUM. Single Copies, Ten Cents.

Manufacture of Linseed Oil.

Linseed oil, made from flaxseed, is the liquid part of ordinary oil paints. It is sometimes obtained by treating the seed with naphtha, thus dissolving out the oil, which is separated by distilling off the solvent for use again. Comparatively little oil is made in this way, most of it being made by extraction under pressure. The seed is coarsely ground, then heated, sometimes by running a jet of live steam into the meal, sometimes by putting the meal into a steam-heated vessel. It is then, by a machine, put into bags and pressed enough to make it take a suitable form, after which these bags are put into a powerful press and the oil is squeezed out. Moisture and other matters are mixed with the oil, and these are separated by allowing it to settle; it is at last filtered. This process of purification takes from one to three months; but even after this the oil improves for a long time by standing, during which some foreign matters separate and settle out.

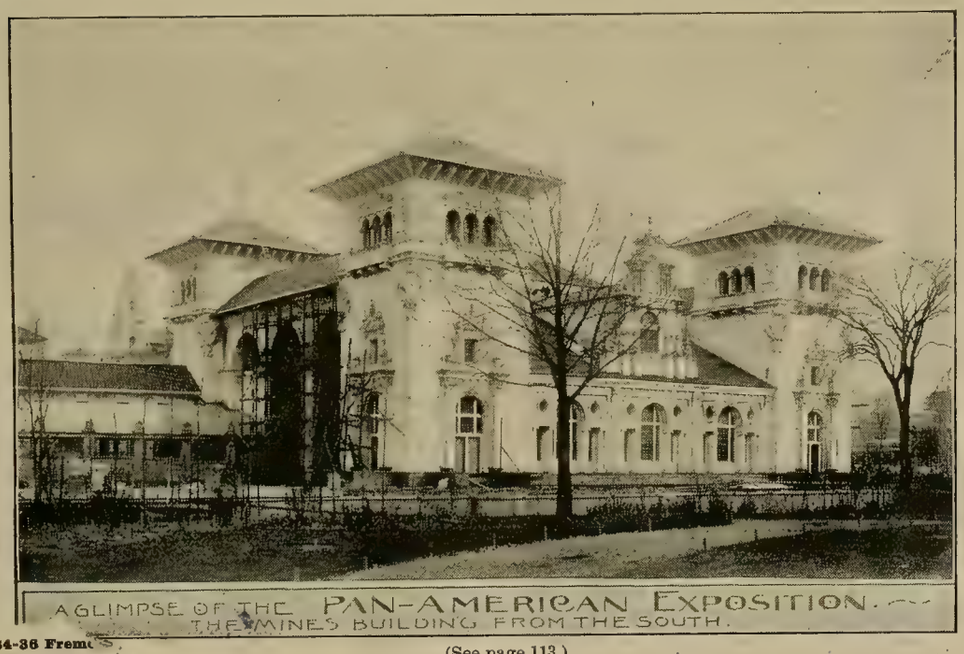
Linseed oil possesses in a higher degree than any other oil the property of thickening rapidly on exposure to the air. This is not due to evaporation, but the contrary; it absorbs and combines with oxygen from the air, and thus increases in weight, though it decreases in bulk. A paint made with raw linseed oil alone will dry so that it may be handled in five or six days; but, as this is a long time, it is thought necessary to treat the oil so that it may dry more quickly—that is, may absorb oxygen more rapidly. Oil so treated is called "boiled oil." It used to be made by heating the oil over a direct fire in a kettle, and with this oil is mixed, by constant stirring, 1% to 3% of oxide of lead, either litharge or red lead, or both, and a small proportion of oxide of manganese. When the oil reaches a temperature of about 500° F., it dissolves these metallic oxides, entering into chemical combination with them; and as these have a great attraction for oxygen, the resulting oil, which is much darker in color than it was, has also greatly increased drying powers, and paint made with it will dry in twenty-four hours. The dark color is due partly to the combined metallic substances and partly to heating the oil for a long time.

It is believed that more oil is present than can combine with the small amount of metallic oxides, and that the product is therefore composed of a small portion of oil combined with the lead and manganese, dissolved in a large portion of oil, which is unchanged except that it has been darkened by heat. It has therefore become the custom of oil manufacturers to cook only a small portion of oil with the lead and manganese; and after these are dissolved, they stir the product into a large quantity of raw oil at a heat about that of boiling water. The boiled oil thus made is much paler in color than that made in the old way, and is said to be as good. It probably is more nearly uniform. But oil made in this way varies according to the amount of oxides used, the proportionate parts of lead and manganese and the heat employed, so that boiled oil from different makers is always different, varying much more than raw oil does.

The foregoing method is the one used by the large manufacturers, but smaller ones sometimes buy their oxides of lead and manganese already combined with just enough oil to make a compound. About four pounds constitute the protective film when a red-lead paint is dry, red lead being a mixture of the peroxide and the protoxide of lead, the latter ingredient being the substance known as litharge. The peroxide is believed to be the characteristic ingredient. Red lead is made by a fire process in a suitably constructed furnace, and furnaces of different construction, or even of the same plan but of different dimensions, give different products. "Commercially pure" red lead, composed of lead and oxygen, contains the peroxide in proportions ranging from 45% to 90%.

The oxide of lead combines with the oil, but the product is a solid cake. To liquefy this it is common to dissolve it in about two and one-half gallons of turpentine or benzine (or a mixture of the two), and this solution, which is a good example of what is called a "drier," which measures less than four gallons, contains enough metallic compound to go into about fifty gallons of oil. The small manufacturer or dealer opens a barrel of raw oil, takes out four or five gallons, fills it up with this drier (which he has purchased from some one who makes a specialty of it), closes the barrel, and, after rolling it about a little to mix it, sells it for boiled oil. Such oil is said to be boiled through the bunghole, and is spoken of disrespectfully by the large manufacturers. Such oil is considered by some to be in every way equal to that made in a kettle.

Schmucker Drill at Work in Stope on 700-Foot Level Sun & Moon Mine, Seaton Mountain, Idaho Springs, Colo. (See page 114.)



A GLIMPSE OF THE PAN-AMERICAN EXPOSITION.—THE MINES BUILDING FROM THE SOUTH.

(See page 113.)

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State Mine Inspectorship.

"Why do you not advocate the creation of a mining inspector in California?" is asked by Redding, Mariposa and Los Angeles correspondents. Chiefly because the manifest advantages of such inspection are (in the judgment of this paper) outweighed by the probable disadvantages. It is the old question of theory and practice. Ideally, State mine inspection is a good measure; protects miners, lessens accidents or liability thereto; places responsibility in case of accident, increases safety and deters loose methods and criminal negligence. That is, ideally. Practically, as things go, it may result in undue reliance on such inspection; in a shifting of responsibility; in the appointment of unfit men because of their political "pull;" in the creation of an office "just for what's in it." There are a few things in connection with this whole matter that must be kept in mind. The manager or superintendent of a mine must necessarily be something of an inspector himself. He doesn't owe his place to political influence, but to competence; and, if incompetent, he soon loses his job. The miner himself, who is supposed to be the chief beneficiary of government inspection, must keep his wits about him all the time, inspector or no inspector, and nothing in the way of management or inspection can take the place of such personal care. Anything that tends to lessen this ever-present feeling of the need of personal care lets in laxity; and wherever or whenever the miner gets the idea in his head that he need not exercise such constant care for his own personal safety, because some one else is paid by the State to look out for him, he is in greater danger than ever before. Post-mortem investigations and inquests are not as effective as ante-mortem vigilance. Argument after an accident as to whether the manager or the inspector or the miner himself was to blame for the disaster would be of infinitely less value than the continuous intelligent precaution against accident that characterizes the miner who realizes that, after all, his best protection lies in his own precaution and the necessary knowledge of his associates. So that, as far as this part of the question is considered, the existence of a government inspector would be a tacit implication that the miner didn't know enough to take care of himself. If there be in any American commonwealth such a body of miners, then they certainly should have an inspector. But the better way where such ignorance existed would be for those not possessed of the requisite knowledge of how to guard against danger to keep out of that kind of work. Then, again, where such inspection exists, there is a constant tendency on the part of all hands to make a scapegoat of the inspector. There is at once a divided responsibility; in case of disaster the investigation disclosing the manager "blaming it onto" the inspector, and the inspector sometimes spying around to see if he can't get some way of blaming the manager for acting in ignorance or defiance of instructions.

The record of California commissions and inspectorships is not favorable to those who believe that a good man could be found to fill the place. There are plenty of "good" men; there is abundance of suitable material, but, as politics go, the really competent man wouldn't have it if he could and couldn't have it if he would. The fact that he was competent would be a bar to his appointment in some quarters, and the kind of man who could well discharge the duties attached to the position is usually employed at a better salary in a more satisfactory way.

There is a good deal of humbug about this mine inspection business, and at the bottom or top of it a flavor of demagoguery. In the belief that honest desire to protect the working miner actuates the idea, we hold that with intelligence on his part should go intelligent, competent management, and that the best way to insure such protection is not by putting a badge on a cheap "inspector," but by putting the full responsibility of his position on the mine superintendent or manager, and not allow chance for shifting such responsibility from the shoulders that should rightfully bear it. No inspection can fully take the place of the right kind of superintendence. Let the manager be made to take the consequences of his management. In case of there being an inspector, were there an accident, the first one blamed would be the inspector, which would be like blaming the constable or the sheriff if one man killed another. It would be unjust to the inspector to hold him responsible for what the superintendent or miners might do, but that is just what would happen, and, knowing this, no man really fit to fill the place would care to take such a position.

Fraud in Oil Stocks.

It is with satisfaction is noticed the development of the oil industry of California, largely by reason of extensive scientific research, the results of which, during the last four years, as given in this paper, have demonstrated the extent and value of the oil bearing area. Through the years much had been said herein, but other matters were given more industrial prominence, and from 1887 to 1898 inclusive there had been produced only 10,605,167 barrels of petroleum in this State, of a value of $12,600,985; but the series of articles referred to attracted such widespread attention and were so indisputably based on actual fact, that the matter taken in connection with the industrial development of the Pacific coast, its manufacturing requirements and the important factor of fuel, made manifest the need and profit of increased oil need, and when it was made apparent that California could be made first in the petroleum production, as it had been first in gold production, the present era of great oil production and development may be said to have begun.

Just now there is more activity in oil than in any other California mineral. A great amount of oil is being produced and meets with ready sale, and the outlook for greater increase in the production gives promise of double the present figures before a great time has elapsed, the demand keeping pace with the production. While it is extremely gratifying to note such development of one of California's many natural mineral resources, yet, some of the accompanying features can not be viewed with satisfaction. As in all commercial pursuits, there is a liability to overdo one form of demand and supply which seems to accompany all mining enterprises.

The companies now being organized in California are numbered by the thousand, and while praise and assistance should be accorded all with just reason for existence, yet the genus wildcat is multiplying too rapidly for safety, and the utmost stretch of constructive demand can not cover many of the manifestly fraudulent schemes now being worked in that direction. It is believed time to sound a note of warning against what is becoming a palpable fraud in the direction of "oil stocks." The legitimate development of the oil industry of the State is giving place in many quarters to what is a craze for "investment" in these meretricious schemes, and the inevitable crash awaits the entire matter, with inevitably unfavorable result affecting the legitimate and illegitimate alike. Insanity seems to have taken the place of judgment in many investments, and the wily manipulators of the bogus companies apparently need but to point to the many examples of success to lure their victims into loss. Eastern papers, even technical mining journals, who know better, have flaring advertisements, making the most ridiculous claims and offering all sorts of statements, most of which are absolutely false.

It is always an unwelcome task to point out those things, but it is a duty owed to the industry to denounce them. This paper contented itself with demonstrating the extent and value of the oil deposits, showing the scientific method of going about the production of oil, thus laying the foundation for the solid superstructure of oil development in the State, but it has steadily refused to publish fraudulent statements and considers, as always, that it is doing the State a service in directing attention to the manifest worthlessness of so many of the present oil schemes, which are not intended to work the mine, but the street. There are few readers of this paper who would be likely to be lured into such ridiculous investments as that proffered by many of those fraudulent schemes in "oil," and the matter is referred to here solely as a protest against such overwhelming fraud. The dupes who lose their money deserve such loss, but the inevitable result must be to the detriment of the legitimate oil industry of the State, and it is the duty of those who are concerned in such legitimate development to aid in exposing the nature and extent of the fraud now being perpetrated by the wholesale.

With proper encouragement and development, the oil industry of the State of California may be made to assume gigantic dimensions, and so many other industries of the State are connected with such oil development that it is a matter of public importance that the windy promoters of these bogus companies shall not be permitted to injure the prosperity of the commonwealth.

The company that proposes to buy or lease land, to purchase machinery and develop the property acquired is to be commended and encouraged, but the bogus companies that have nothing and do not expect to do anything but "organize" and sell stock on the strength of lying advertisements are a curse to the State.

THE metric system is more and more referred to and used in these columns every year because it is the coming system of measurement. 'Tis thirty-five years since the United States by Congressional enactment made its use legal, and the present Congress is about to pass a law making the metric system the standard of weights and measures in this country. The whole subject is closely allied with scientific business progress. It is becoming of world-wide use; a world-wide business power like the United States needs it, as a part of universal trade development and expansion. Its scientific features are accurate and not arbitrary as are those of our present system; but the scientific aspect of the case was presented long ago. The use of the metric system is now a business necessity the same as any other modern method. It is no longer a question of argument, or like or dislike; the decimal in weights and measures means gain in dollars; the old system means loss. Business men have discovered that "it pays," and that settles it.

A COMMON mistake in a mining scheme is impatience—hurry for quick returns. Ordinarily when a new business is to be built up, investors rightly recognize the injustice of expecting immediate dividends therefrom. A mine must be made, and it is unjust and unbusinesslike to expect that it will begin paying dividends until after considerable outlay and necessary development. More than one good mine prospect has been spoiled by the haste and impatience of its co-owners, and no amount of ability or experience in the mine's manager nor of care and good intent on the part of the company directors can overcome the mischief made by a majority of mine stockholders who are in too great haste for dividends.

Concentrates.

THE duty on imported cyanide of potassium is 25% ad valorem.

DROPPING 1, 5, 9, 7, 3, 2, 6, 10, 8, 4, in a 10-stamp battery should give good results.

IT is believed that 30 miles below the earth's surface is the greatest depth at which earthquakes are known to originate.

IT is not possible to "give a scientific definition of life." That which holds matter together, would probably be approximate.

MINING MEN visiting San Francisco are cordially invited to visit the MINING AND SCIENTIFIC PRESS office, where all may see their home papers, etc.

AN "ore shoot" refers to a body of ore in a ledge or vein; an "ore chute" is that through which ore is discharged from a stope or upper level to that below.

A CIRCULAR INCH is the area of a circle 1 inch in diameter—.7854 square inch. A square foot = 183.35 circular inches. A square inch = 1.2732 circular inches.

THE Bay Counties Power Co. has transmitted electric power from the Yuba river to Vallejo, Cal., 120 miles. The Telluride Power Co., Utah, has transmitted 40,000 volts 32 miles.

THE presence of ammonium sulphate is not uncommon in flue dust, and in the liquid condensed from lead furnace fumes. It partially comes from the residue left in the coke and furnace gases.

THE question of permitting the erection of sawmills in forest reservations is now before the General Land Office. It is probable that a limited number of permits will be issued with stringent regulations.

RECORDS of experiences in mining and milling would be of interest and value, and our readers are invited to send such notes of such experience as contribution to the common stock of general knowledge and information.

BAD and loose surveying is exceedingly expensive; there is no system so conducive to true economy as accuracy. Of recent years the method of surveying and plotting by co-ordinates has been extensively adopted.

IN mining the term "apex" does not mean a point. It means the top of the ledge or lode, that which comes nearest the surface. The part from foot wall to hanging wall at the top of the lode nearest the surface is the apex.

ORDINARILY in the bed of a water course, a current or continuous movement of the water of 3 inches per second will scour fine clay; 6 inches, fine sand; 9 inches, coarse sand; 12 inches, fine gravel; 2 feet, round pebbles 1 inch in diameter; 3 feet, angular stones, 2 inches diameter.

ELECTRIC flashlight signals are in use in deep mines in Butte, Mont., Leadville, Colo., and elsewhere, and are feasible wherever there is an equipment of electric lights. They are deemed superior to the electric bell system, the insulation of which in a wet mine is constantly interfered with.

THE amount of zinc used in the cyanide process is a very small percentage of the total zinc production. Assuming that 20,000,000 tons are annually treated and that one pound of zinc per ton is used, that would be only 10,000 tons required, or about 1% of the world's production.

A GAS ENGINE will develop equal power using 10% less distillate than gasoline; 50 gravity distillate costs 11½ cents per gallon, gasoline 17 cents, in California. Distillate is cheaper than gasoline, but more likely to be dirty. A 60 H. P. engine will use about seventy gallons gasoline per ten hours.

SEVERAL American metal mines are considerably below ocean level, notably in California and Michigan. The bottom of the deepest shaft of the Calumet & Hecla is nearly three-fourths of a mile below the level of the ocean. The bottom of the Kennedy mine, Cal., is nearly 1000 feet below sea level.

THE mil and circular mil are used in electrical calculations in which may be involved area or diameter of wires. One mil is .001 inch in diameter; a circular mil is the area of a circle 1 mil (.001 inch) diameter. One square inch = 1,273,239 circular mils. One circular inch = 1,000,000 circular mils.

IN the cases now being argued before the U. S. Circuit Court of Appeals in San Francisco, involving titles to mining claims in Nome, the point to be determined is the right of title to a claim which has been located by an alien and subsequently transferred to a citizen, a third person locating the claim after the transfer had been made.

WATER GAS may be made by passing steam through incandescent anthracite coal, the resultant gas passing to a carburetor, where it receives the necessary hydrocarbon from petroleum. In a third cylinder a superheater raises it to a high temperature and frees the gas from pyroligneous acid. It is subsequently passed through conduits, in which it is freed from ammonia and sulphur.

THAT new mining districts are not found more frequently is due in some respects to the miner restricting his search for ore to those formations and to that character of ore with which he is familiar, and may, therefore, for a lifetime walk daily over high-grade ore in plain sight, which in appearance so differs from his notions of what constitutes an ore that he regards it as barren rock.

GIANT or other powder should not be stored in tunnels, or underground at all; to store, say, 400 cases, there should be a magazine, properly ventilated, about 14x16 feet; 10 feet in the clear; the bottom row on slats, then slats on top of the first row of cases, and so on. The nitro-glycerine in giant freezes at 46° F. (14° above the freezing point of water), and powder may become chilled without being actually frozen.

ADVERTISERS in this publication should be favored by our readers in placing orders. Those who advertise seek trade and it is business to patronize those who want your business. Besides, it is our advertisers who enable us to furnish this journal for $3 a year. Were it not for the advertisers, fifty-two copies of a paper like this could not be delivered for twice the money. Hence in helping with your business those who advertise herein you help yourself.

IN a case decided by the Supreme Court of the State of Montana—Yaux vs. Bordeaux, 58 Pac. Rept., 42—where the lessees of a mine had agreed to operate a mine in consideration of the owners furnishing all necessary supplies, "the net proceeds" of the ore after milling to be divided between the owner and lessees, it was held that in determining "the net proceeds," only the cost of smelting, and not the cost of mining, hoisting and handling the ore should be deducted from the gross proceeds.

IN the treatment of ores with solutions of cyanide, the cyanide dissolves the free metal, which is generally gold, so long as free oxygen or its equivalent is present, and subsequently any remaining cyanide attacks the compounds of its base metals; hence, when comparatively much cyanide and little oxygen is present, as in strong cyanide solutions, much base metal and little gold is dissolved; but in dilute cyanide solutions the conditions are reversed, and so, also, is the result, so that much gold and but little base metal pass into solution.

THE use of "technical terms" can not be avoided in discussing technical subjects. A "technical" term is usually an exact term, a word that in connection with the subject could not well be replaced by any other. Every business or pursuit has its "technical" terms applying to that particular calling and of unavoidable use in discussion thereof. Mining and metallurgy have no more than other pursuits or sciences. There is an exact precision about a technical term that renders necessary its use in law, hod carrying, navigation, mining, poker, ore concentration, and other exact sciences.

BOWMAN'S dam was built in 1872 near Cisco, Cal., in the foothills of the Sierra Nevadas, on a tributary of the South Yuba river, and holds 450,000 miners' inches. The surface area is 502 acres; the dam is in a narrow gorge at the outlet of the valley, and is 425 feet long, 100 feet high, made of cedar and tamarack, forming a crib firmly bolted together and filled with rubble stone. The base, 15 feet thick, diminishes to 6 feet on top, the stones composing the wall weighing from one to five tons each. The facing of the dam above the 60-foot mark is of heavy sugarpine planks, firmly spiked to 8-inch cedar ribs fastened to the main crib by long iron bolts.

U. S. SENATOR STEWART from the Senate committee on mines and mining this week reported a substitute for the mining bill heretofore introduced by himself. The substitute prohibits any person from locating a mining claim, lode or placer for any other person, corporation or association. The substitute also authorizes the purchase from the Government of land believed to contain oil at the price of $2.50 per acre. It is designed to enable any U. S. citizen to file on 160 acres of unclaimed vacant land "which he believes contains valuable quantities of oil," such filing to give control of the land for six months, during or at the end of which time the land must be paid for.

ROCK in place and the ore therein unworked is real estate. If separated therefrom by artificial means with intent of such separation the mineral becomes personalty. If detached by natural causes, it remains part of the real estate. In common law, tailings belong to the mine owner, while on the mine premises; if permitted to go outside the mine boundaries they become subject to outside claim; but in some States—Idaho, Utah, Montana, California and Colorado—the mine owner can acquire as by eminent domain dumping ground, or right of way for tailings and other mine debris. Meanwhile, if the matter be one of much money importance, the advice of an expert mining lawyer is in order.

INDUCTION or inductance is that property in virtue of which a finite electromotive force, acting on a circuit, does not immediately generate the full current due to its resistance, and when the electromotive force is withdrawn time is required for the current strength to fall to zero; a quality by virtue of which the passage of an electric current is necessarily accompanied by the absorption of electric energy in the formation of a magnetic field. Induction or inductance, so far as it affects the carrying capacity of a conductor, is purely a phenomenon of variable currents. Its effect is to introduce a sort of spurious resistance, its mechanical analogue being inertia. In resistance coils the wire is usually wound non-inductively simply to insure the absence of this spurious resistance. Current from a battery, for instance, is for comparatively long intervals perfectly constant, so that resistances to be used on battery circuits if not subjected to outside influences might just as well be wound inductively as non-inductively. The dynamo current, however, is never quite constant—it is always, to a certain extent, pulsating, and this pulsation, however slight, would introduce self-induction in the coil were it not wound non-inductively, which would modify its apparent value as a resistance. One can never be quite sure that induction from other circuits may affect the coil, hence the practice of winding non-inductively.

THE result of a grounded circuit in an ordinary isolated lighting circuit is that a portion of the current passes to the earth and represents a direct loss. When a ground occurs on a lighting circuit the brilliancy of the lamp will be reduced, if the machine is well loaded, and if the brilliancy be restored it will add slightly to the load on the dynamo. Beyond this there would be little effect noted at the machine if the area of the brushes be sufficient to take off the current. In a grounded circuit, such as an ordinary railroad circuit, one pole of the generator is put to the ground and the other connected with the line. The only effect that this has on the generator is to change the strain due to full voltage of the generator upon insulation from the coils to the frame.

TO SEPARATE gold and platinum, the metal is digested with nitric acid, specific gravity 1.199, as long as any silver dissolves. The metal is then washed and digested with aqua regia (composed of 100 concentrated HCL, 43 concentrated HNO_3, 143 vols H_2O) until the silver chloride forming on the surface of the metal prevents further action. The solution of gold is then poured off and the silver chloride is removed by treatment with dilute ammonia, when the metal is again in condition for further treatment with aqua regia. After six alternate treatments with aqua regia and ammonia the residual metal consists of pure gold. The acid solution containing the gold is evaporated with excess of hydrochloric acid to drive off nitric acid, until gold chloride crystallizes out. This is then dissolved and a small amount of platinum removed by adding ammonium chloride, the gold finally precipitated by ferrous sulphate.

FOR a volumetric determination of copper by potassium cyanide solution, dissolve 10 grams of potassium cyanide in 250 cc. of water and mix thoroughly. Weigh 2 grams of pure copper wire, transfer to a one-fourth-liter flask, add 25 cc. nitric acid, and warm gently until the copper is all dissolved; boil to expel oxides of nitrogen; cool, dilute with water to the mark, and mix well. Take 50 cc. of this copper solution, transfer to a No. 3 beaker, add ammonium hydroxide until the precipitate formed dissolves and the solution is alkaline. Fill a 50 cc. burette with the potassium cyanide solution, and gradually drop the cyanide solution into the copper solution until the blue color disappears and the solution becomes colorless. Note the number of cubic centimeters of potassium cyanide solution required to do this, and mark upon the potassium cyanide bottle the value of 1 cc. in terms of copper. Thus: suppose 50 cc. of the copper solution required 31.3 cc. of potassium cyanide solution: then 31.3 cc. KCN equals 0.40 gram Cu, and 1 cc. KCN equals 0.0127 gram Cu. Having thus obtained the value of the potassium cyanide solution, it can be used for determining percentages of copper in alloys, bronzes, etc. For example, brass: Two grams of brass are weighed out and treated with 25 cc. nitric acid and the solution made up to 250 cc. Fifty cc. of this solution are made alkaline with ammonium hydroxide, and titrated with the potassium cyanide solution. Having determined the number of cubic centimeters of potassium cyanide solution required to decolorize the 50 cc. of the brass solution, the percentage of copper is calculated from the above data.

SULPHIDE ORES (if not roasted) and ores with calcite, dolomite and manganese are not adapted for chlorination, as they use up too much chlorine. A test for suitability of ores for chlorination may be carried on as follows: Place the completely roasted sample in an ordinary sodawater bottle with enough water to make the whole of the consistency of thin mud. The ore and water should together occupy about two-thirds of the bottle. Bleaching powder and a thin glass bulb filled with dilute sulphuric acid are then to be added, and the bottle securely closed. As cork is attacked by chlorine, glass or vulcanite stoppers are better; the screw-stoppered bottles are most convenient. If a cork is used, it must be wired down. The bottle is then shaken so as to break the sulphuric acid bulb and mix its contents with the bleaching powder, when chlorine is evolved. The bottle is now left for several hours in a warm place, being shaken occasionally by hand to mix its contents. At the end of ten or twelve hours the bottle is opened, and, if excess of chlorine is still present, the liquid is separated from the ore and the latter washed thoroughly by filtration or decantation. The liquid and washings, whether clear or muddy, are warmed to expel free chlorine, and an excess of ferrous sulphate is then added to them. The precipitate is collected, scorified with lead, and cupelled. In all cases it is better to keep the first liquid separate from the washings, which should be concentrated by evaporation, since if this is not done the precipitate of gold may be too fine to settle and will pass through filter paper. A better method of precipitation is to boil the liquid with iron filings for a few minutes, decant through filter paper, wash the filings, and dissolve them in dilute sulphuric acid, when a residue of gold is obtained which is easy to filter. Bromine may be used instead of the materials generating chlorine. The quantities of chemicals required will be such as are sufficient to generate a volume of chlorine equal to twice the capacity of the bottle used, or a solution of 2% of bromine in water works well.

Stamp Mill Steam Practice.

Written for the MINING AND SCIENTIFIC PRESS by A. W. WARWICK.

A careful examination of a very large number of stamp mills, in different Western States, has shown that the power plant of such mills is the most inefficient portion of the mill. It is pitiable to see a millman strain every nerve to save a fraction of a cent per ton, in quick or screens, when the engines and boilers are losing dollars every day. These remarks apply, of course, only to the 5 and 10-stamp mills, such as one ordinarily sees, although there are occasional exceptions. In the large stamp mills of such concerns as the Montana, Ltd., and the Homestake the steam practice is as good as it can be.

Carefully kept statistics show that the average consumption of coal in the little 5 and 10-stamp mills is not less than seven pounds per horse power hour. There is no reason in the world why it should exceed four pounds. With coal—or its equivalent—at $5 per ton, this loss amounts to $4.50 daily in a 10-stamp mill, or say 15 cents per ton of ore. This loss is caused by (1) engines with throttling governors, (2) engines being too large or too small, (3) lack of water heaters, (4) insufficient protection of steam pipes and boilers.

In putting engines and boilers into these mills the designer or erector seems to be guided by one or other of two principles: (1) to have power enough so that the mill can be enlarged at some future date, (2) to get "cheap" power. The man who puts in a cheap steam plant, except in the case where he cannot afford the money for a good outfit, is not a fit person to engage in mining. The best is the cheapest in milling and mining, as in everything else. We will not consider this case. There is something to be said, however, in the other case, for the intentions are good.

Without going into details of steam practice, it may be stated that every engine has its economical load—in other words, it does not pay either to overload or underload an engine. For an automatic cut-off engine (and no other should be used) the economical load is being carried when the valve cuts off at from $\frac{1}{8}$ to $\frac{3}{8}$ the stroke. At this cut-off an ordinary 30–40 H. P. engine will use about twenty-five pounds steam per horse power hour. When the engine is underloaded, so that it will cut off at $\frac{1}{10}$ to $\frac{1}{5}$ of the stroke, the steam consumption will be at least thirty-two pounds per horse power hour. Now, when the engine in a 10-stamp mill is large enough for a 20-stamp mill—say a 60 H. P. engine—just this case occurs. When an automatic cut-off engine is overloaded the cut-off adjusts itself to the load, the point at which it cuts off being $\frac{1}{2}$ or more of the length of the stroke, and full advantage cannot be obtained of the expansive qualities of the steam. Hence a loss of fuel. Let us see the annual coal bill of a mill in one case where the engine is proportioned to its work, in another where the engine is capable of doing twice the work. These figures are not hypothetical, but are based on actual personal experience.

(1) Mill engine developing 33 I. H. P. at $\frac{1}{8}$ cut-off; evaporation of coal, $7\frac{1}{2}$ pounds water, using exhaust steam heater; 40 H. P. boiler:

Daily coal consumption, 2376 lbs., $4.50 per ton.$	5.34
Cost per ton ore	17.8

Yearly coal bill at 350 working days.....$1869.00

(2) Mill engine developing 35 I. H. P. at $\frac{1}{5}$ cut-off; evaporation of coal, 7 pounds water, using exhaust steam heater; 80 H. P. boiler:

Daily coal consumption, 3768 lbs., $4.50 per ton.$	8.47
Cost per ton ore	28.2

Yearly coal bill at 350 working days.....$2963.00

A difference of $1094 per annum, and 10.4 cents per ton in working costs, in favor of the smaller engine.

We will return now to the man who wants an engine "big enough" or the man who is so enthusiastic as to believe that his plant will be doubled or trebled in size in a very short time. For answer to the first man we would say that having regard to our coal bill we want an engine large enough, of course, but when it comes to an engine larger than our needs we respectfully differ. To the second man we would say, that in not once out of ten times is a 10-stamp mill enlarged to a 30 or even 20-stamp outfit; also that in the occasional case of enlargement the increase hardly ever occurs within a year or two of the time set. The policy the writer would adopt would be to put in an engine of the right size. Then, if within a couple of years, owing to a happy combination of circumstances, the plant were enlarged to twenty stamps he would put in an engine, suitable to its load, to drive the larger mill, at a cost of not to exceed $2000. In the two years $2188 would have been saved in fuel, in addition to the difference in interest of the two plants. So that the saving in coal would pay for the new engine and boiler and the old engine and boiler would still be on hand to do other useful work if needed; anyhow it will be on hand and you will have two outfits for the cost of one.

An exhaust steam heater is a necessity in a steam plant of almost any size. The ordinary little heater filled with small tubes is a nuisance. It speedily chokes up with incrustation and is a great trouble to clean. A heater of the tray order, such as the Hoppe, is the only kind to buy. The functions of a heater are two: first to feed hot water to the boiler, second to keep the boiler free from incrustation. In both cases fuel is saved when exhaust steam is used. A heater saves 1% in fuel for every rise of 11° that it heats the water sent to the boiler. If, therefore, the heater raises the feed water from 60° to 200° then a saving of $\frac{140}{11}$ or $12\frac{3}{4}$% is effected. In reality it is more than this, owing to the absence of incrustation in the boiler.

In selecting the engine nothing but an automatic cut-off engine should be used. It is true that such an engine runs at a higher speed than a throttling governor engine but this is readily adjusted by pulley sizes. The difference in coal consumption is immense; the writer would not have a throttling governor engine in a mill on any condition. For a 30-stamp mill or larger nothing but a Corliss engine should be considered. As for the boiler, up to 60 H. P. the ordinary return flue boiler would be a good selection. Beyond that, and up to 100 H. P., a water tube boiler of standard make may well be considered, and above 100 H. P. a good water tube boiler is emphatically the best. A "freak" boiler should on no account be even thought of: only a good standard make should be selected.

The foregoing considerations on the selection of the units in the motive power naturally lead up to the question of the power required by a stamp mill. The following figures, which are from one of many tests made, show the power consumed by a 10-stamp mill of 850-pound stamps, 6-inch drops, ninety per minute:

	Actual H. P.
Ten stamps	17.85
7x10 rock breaker	4.95
Two 6-foot vanners	2.50
Friction of shafting	5.30
Total	30.60

This does not include friction of engine.

In a preceding article the writer has shown the method of calculating the power required by a stamp head. From the formulæ given the power required for any other stamp mill can be calculated, taking as the total horse power required the sum of the following: 1. Horse power of stamps alone. 2. Power for running rock breaker. 3. Power for the concentrating machines, if used. 4. Friction of mill shafting. However, in designing a new mill, the length of drop the ore may require is uncertain. A good mill man with a large coefficient of experience can come pretty nearly judging the drop required by a certain ore with a given weight of stamp. If he thinks a 6-inch drop would be needed, in figuring on the power he may well use a 7-inch drop; then, should perchance an 8-inch drop be needed, the slight increase of power required could readily be taken care of by the engine without, practically, any loss in efficiency. The following table gives the actual power used by 850-pound stamps falling 6, 7, 8 inches ninety times per minute; H. P. shown by indicator diagrams:

6-inch drop	1.785 H. P.
7-inch drop	2.112 H. P.
8-inch drop	2.430 H. P.

In figuring on the rock breaker, the power may be taken as that given by the various foundries in their catalogues, although as a general rule the power given is too high. The power required by a rock breaker is a very variable amount, depending upon (1) manner of feeding, (2) character of rock, (3) condition of machine. In figuring the power the machine shops allow a certain amount for friction of transmission shafting, which the writer always figures separately. The following figures show the power required by three different rock breakers on fair ordinary ore:

7 x 10 breaker (Blake)	5.0	H. P.
8 x 12 " "	6.5	"
9 x 15 " "	9.25	"

Still, for a hard saccharine quartz it might be well to raise these powers 25%.

The power used for any concentrating machinery will have to be allowed for from the estimates of the makers. It is, however, for a small stamp mill very slight. For a 4-foot Frue vanner the writer uses $\frac{3}{4}$ H. P.; for a 6-foot Frue, $1\frac{1}{4}$ H. P.; for a Wilfley table, $1\frac{1}{4}$ H. P.

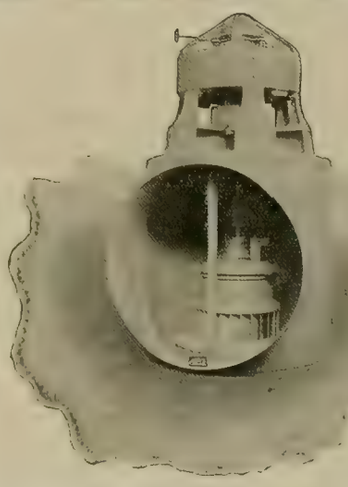
After summing up the power for the rock breaker, stamps and concentrates, a certain amount should be added for friction—generally 20%. It is well enough to allow sufficient power for friction, but no stamp mill should require 20% of the total usefully applied power to overcome friction; 15% should more than cover it. The practice of having an oiler going around with a handful of waste and an oil can is a barbarity, especially in a stamp mill, where grease is so harmful. By such a method of oiling, grit inevitably gets in the bearings; if this is denied—and such has been done—it can not be denied that under such circumstances the bearing is at times flooded with oil and at others quite dry. The only method is to have lubricators, such as the very simple needle-lubricator; very slight attention to these once or twice a week, and using a suitable lubricant, will materially lessen the friction and abolish hot bearings, with all that the latter implies—increased power and danger of fire.

To obtain the indicated horse power it is necessary to add the engine friction. This will vary with the type of engine, and can be furnished by the engine makers. For a good make of simple, non-condensing, automatic cut-off engine, 5% of the economical load may be used where no other data is available.

By lack of care in design or in running the steam plant of a stamp mill, an increase of 10 to 15 cents per ton in cost of milling is readily made.

Massachusetts Chemical Company's Water Wheel Plant.

The accompanying engraving is of a 33-inch cylinder gate Victor turbine, recently furnished to the Massachusetts Chemical Co., Walpole, Mass. There is nothing novel in the setting of the water wheel, but the combination of the water wheel and the generator, new in some parts of the country. The wheel operates under about 14-foot head, developing about 115 H. P. at 150 revolutions per minute. The wheel is set in a steel flume with cast-iron heads, the water being conveyed to the flume by means of a steel feeder pipe. The flume stands on I beams across the



pit, with the customary draft tube leading from the wheel to the tail water. Floor space in this particular case, however, was valuable and for that reason the generator was mounted directly on top of the water wheel shaft, the shaft through the armature being an extension of the water wheel shaft. The generator is a direct-current machine.

The weight of the armature is carried by means of a thrust bearing, which is a combination of rings and pressure running in oil. This bearing is mounted on top of the flume cover immediately underneath the armature of the generator, making a complete outfit, unique in its way, and one that could be used to advantage in many places where light powers are to be developed. Further particulars may be had from the designers and manufacturers, The Stilwell-Bierce & Smith-Vaile Co., 276 Lehman St., Dayton, Ohio.

A Disputed Statement.

TO THE EDITOR:—The statement that if an ounce of iron and a ton of iron were dropped from the same vertical height at the same time, the ounce piece would reach the ground first, because of the resistance of the air, is not correct, because if we take a sphere for example, as the resistance for any given velocity is nearly in proportion to the area exposed to atmospheric resistance, which would be the area of a great circle of the sphere, it follows that the atmospheric resistance varies nearly as the square of the diameter, while the mass or weight varies as the cube of the diameter. From this it will be seen that the ratio of the atmospheric resistance to the weight, for bodies of a given density, traveling at the same velocity, decreases as the size of the body increases and therefore the ton of iron would reach the ground before the ounce of iron.

Deadwood, S. D., Jan. 26.

Exhibit at Buffalo, N. Y.*

At the Pan-American Exposition at Buffalo, N. Y., will be an exhibit of mines and metallurgy. The building to be devoted to these purposes is one of a group of three structures arranged in the form of a horseshoe, at the western boundary of the Esplanade. The Mines building is the southernmost of the group and is 150 feet square; at each of the four corners it has a square tower 90 feet high. The eastern facade, looking upon the Esplanade, shows three high recessed arches between the towers, forming an open loggia, ornamented with plastic detail and decorated in brilliant colors. From this loggia are the main entrances to the building. There are also entrances in the corner towers.

*See illustration front page.

Concentrating Tests and Calculations.*

OTTO F. PFORDTE.

The great advance of the last twenty years in the specialization, delicacy and efficiency of ore concentrating apparatus calls for a finer system of testing both the qualities of the ores and the operations of machines in this department. In amalgamation, lixiviation and smelting the daily employment of physical and chemical tests has been recognized as necessary, and the cost of the necessary laboratories and employes is cheerfully paid. But while much progress has been made in concentration—due, in a large degree, to the study of the subject in our technical schools—it is still too common in actual practice to follow the loose old method of roughly estimating, once for all, that a given ore "concentrates x tons into one," and resting on this assumption so long as that ore continues to be treated, while assays of the tailings from concentration are made from time to time, without exact determination of their quantity.

The first step toward accuracy of control must be a more frequent and precise measurement of the quantity of concentrates from a given operation. This should be expressed in pounds per unit of one ton, and the variations shown in frequent determinations will furnish a constant check upon the character of the ore and the performance of the apparatus. But this is only a part of what should be constantly and systematically done to insure the best work upon a material which must vary continually, even though it come from one mine only.

If, in any mill, appropriate laboratory tests were made at least once a week, the labor and expense involved would be amply repaid by increased knowledge and control of the current operations.

A small testing laboratory, provided with a few gold pans, vanning placques, coarse and fine scales (the former weighing to 2000 and the latter to 50 or 100 grammes, with 5 to 10 milligramme indications), a water trough, a wash bottle, a water faucet (if conveniently practicable), a small drying oven and a set of sizing screens would suffice for the ordinary control of mill work.

For testing new ores, a mortar and pestle and a simple apparatus for fine grinding should be added; and for some tests of special delicacy and complication a small spitzlutte and a testing jig would be useful. The total cost of the apparatus would be so small, in view of the economic results to be secured, that it would be wise to furnish at the outset all the conveniences likely to be required.

In discussing the use of such a laboratory (in connection with the assay office, the existence of which is assumed), certain well-known principles must be borne in mind. It is unnecessary to do more than to enumerate them:

1. It is commercially impracticable to concentrate any ore without some loss of valuable material. If the concentrates are pure, the loss in the tailings will be so much higher. If the tailings are barren, there will be so much more worthless material in the concentrates, which will consequently be of lower value per ton.

2. Whether a smaller or larger amount of gangue can be economically allowed in the concentrates will depend partly on the ore itself, partly on local conditions—such as cost of labor, freight and smelting—and, finally, on the capacity of the machinery to treat, without overdriving, detrimental to technical efficiency, a given amount of ore daily.

3. Every laboratory test should always be of the general nature as that of the corresponding operation in practice, but more careful and accurate in degree.

4. The difficulty of concentrating an ore increases directly with the number of substances to be separated, and inversely with the difference between the specific gravity of the lightest of the useful materials to be saved and that of the heaviest minerals of the useless gangue from which they are to be separated. When these specific gravities are equal, no satisfactory separation can take place.

5. In the tests, as well as in actual practice, sliming is to be avoided as far as possible by crushing the ores as coarsely as is consistent with the best separation.

6. Assays serve to determine commercial values, but give no exact clue to the "concentrating character" of an ore, or the operation of the concentrating apparatus. That is to say, the practically perfect or imperfect concentration of an ore is entirely independent of its commercial value.

7. Each concentrating ore furnishes its own standard of a theoretically perfect concentration, and this standard varies not only for ores from different mines, but also, at different times, for ores from the same mine.

TESTS TO BE APPLIED IN A CONCENTRATING MILL.—Assuming such a mill to be provided with an assay office and a testing laboratory, as proposed above, we may outline the advisable tests as follows:

As convenient, take a daily or weekly pulp sample; weigh out 2000 grammes; concentrate carefully in the gold pans or vanning placques; dry the resulting concentrates and weigh in grammes. Each gramme of concentrates thus obtained represents 1 pound per ton of ore.

The weights and assays found by the test should fairly correspond with the actual weights and assays of the concentrates for each ton of ore crushed. The corresponding tailings of the test should also be assayed, and the results should agree fairly with practice.

These tests and assays should be made at regular intervals, and records of them should be either kept in figures or graphically plotted in a continuous broken line, and continually compared with the actual mill results. This procedure will show the practicable standard of concentration, and detect at once any failure of the mill apparatus to do its best work for the given conditions.

Moreover, not only these formal tests but also occasional informal daily tests of the tailings should be made by taking a small but uniform quantity each time, and, without drying or weighing, washing it down in the pan or placque, and making a mental comparison with previous tests as to the amount of valuable mineral lost.

Inaccuracies in the operation of the concentrating machinery may thus be detected and remedied much more quickly than by the longer and sometimes impracticable process of assay tests.

TESTS TO BE APPLIED TO NEW ORES.—A sample may either be pulverized or in larger pieces. In the first case weigh out 2000 grammes or a proportional quantity, according to the size of the sample; concentrate carefully in pan and placque, and note all the constituents of ore and gangue, using a magnifying glass if necessary. Dry and weigh the concentrates. Each gramme (or proportional part) represents 1 pound per ton. Assay the pulp, concentrates and tailings to obtain data for calculation. Due account of the slimes should be taken, as the sample may have been ground unnecessarily fine. In case of a massive sample, inspect and then crush, screening frequently through a 30 to 40-mesh screen, to avoid sliming as far as possible, and proceed as stated above, not omitting inspection on the vanning placque, where some substance may appear which escaped detection in the massive piece. In cases where the valuable mineral is very coarse and suitable for jig concentration, employ coarse crushing, using say from 8 to 20-mesh screens. Separate the coarse from the fine material on a screen of about 30-mesh per inch; treat the former by jigging and the latter by pan or vanning placque; dry, weigh and assay the results separately. The assays of the tailings should fairly agree. The jig tailings may be a little higher than the rest, for which the ore amply compensates in practice by the larger amount crushed and the decreased tendency to sliming.

This operation will also give a fair idea of the screen size best adapted for jig work, as it is desirable, in the great majority of cases, to avoid recrushing the jig tailings. Incidentally, assays may also be made of the various selected pure mineral constituents of the ore, to ascertain which of them carries the chief values.

Such tests on new ores are, however, not intended to replace the customary mill runs, but merely as preliminary inquiries, reaching quick and fairly accurate results, which may render unnecessary the making of expensive mill tests on unknown ores.

When the preliminary tests have given favorable results, it is very desirable—in fact, essential—to make a trial run of several tons with the proper mill machinery before incurring further expense.

CALCULATIONS UPON CONCENTRATING ORES.—In calculating the concentrating properties of an ore it must be remembered, first, that the total metallic contents of an ore, or of its products in concentrates and tailings, are entirely independent of the degree to which concentration is carried; secondly, that the assay value of the concentrates, in perfect work, increases in proportion as the concentration proceeds, until finally, when all metallic and barren materials have been separated, further mechanical concentration ceases. Therefore, when the assay and ratio of a concentrating ore are given, the amount and assay of the concentrates are readily obtained.

To use a simple illustration: Let us assume a perfect concentration of an ore assaying 12 ounces of Ag per ton and 3% of Pb and 2% of Cu (which corresponds to 12 ounces of Ag, 60 pounds of Pb and 40 pounds of Cu per ton). Let 1 ton of this concentrate to 275 pounds. Then the concentration is 2000 to 275, or 7.27 tons into 1, which is used as a factor for multiplying the results of the ore assays to obtain the corresponding theoretical assays of the concentrates. In this case it is found that 7.27 times the assay results of the ore given for the concentrates equal 87.24 ounces Ag per ton, 21.81% Pb and 14.54% Cu per ton, assuming that all the metal contained in the original ore is collected in the concentrates.

However, as such a perfect concentration is impossible, a practicable standard must be established. This is done by careful concentrating tests, in which the unavoidable loss depending on the nature of the ore is determined. Suppose that, in the last example, this loss in tailings has been found to be one-tenth of the assay value of each mineral constituent, although the concentrating ratio remains the same, as the lost mineral has been replaced by gangue. Of course, the percentage of loss of the various minerals is not really uniform, so that for each metal this loss must be determined separately. For simplicity only, a uniform loss of one-tenth is here adopted.

By difference it is found that 10.8 ounces of Ag, 54 pounds of Pb and 36 pounds of Cu would be available for extraction if an entire ton of tailings, containing 1.2 ounces of Ag, 0.3% of Pb and 0.2% of Cu, had been lost. But as only $\frac{2000 - 275}{2000}$ tons were lost, this figure becomes a factor for the Ag, Pb and Cu of the tailings, reducing the actual losses to 1.04 ounces of Ag, 5.18 pounds of Pb and 3.45 pounds of Cu, which, subtracted from the contents of the ore, will leave 10.96 ounces of Ag, 54.82 pounds of Pb and 36.55 pounds of Cu as the available mineral in the ore. From these figures the percentage of extraction is readily obtained.

The variations in concentrating ores are infinite, but by the method sketched above a practicable standard can readily be established for each individual ore, which may be considered as constant, within a reasonable limit of time, for ores from the same mine.

* Richmond Meeting Am. Inst. Min. Eng.

Clear Creek County, Colo., Tunnel Work.

What is known as the Newhouse tunnel is the property of the Argo Mining, Drainage & Transportation Co., of which L. Hanchett is manager. The tunnel is projected to run from a point below the town of Idaho Springs, Clear Creek county, to Eureka gulch, a short distance above Central City, Gilpin county, cutting through Seaton mountain, Russell Gulch district and Quartz hill, the total distance being about 20,000 feet. It crosscuts a number of well known veins and cuts about 1700 feet vertically below the highest points in its course, which makes about 2000 feet on the incline of the veins. The work has progressed about 10,000 feet, which takes it to a point below the summit between Clear creek and Russell gulch. The bore of the tunnel is larger than the usual size, is double-tracked and has 4-inch pipe for compressed air and 18-inch pipe for ventilation. The material is hauled out by mule power. The drill work is being done by three Leyner air drills. The entire course of the tunnel is in a straight line. So far as ascertained, the enterprise has the friendly co-operation of the surface owners along its course, the tunnel company having contracts, which relates to transportation of material, with the principal mine owners. It owns numerous claims on the surface and proposes to lease other territory. On the Seaton mountain side the deepest workings from the surface are 800 to 900 feet, and the fact that the tunnel company find good ore in the same veins from 800 to 1000 feet lower convinces all that in this section the ore bodies go down, carrying their values with them.

The Gem Extension and Freighters' Friend are much interested in the veins cut by the tunnel below them, and it is likely some connection with the latter will be made. Both these properties, which are well developed, are good shippers; the former is in charge of W. E. Renshaw and the latter is managed by John Owens.

The Sun and Moon, under the management of H. N. Sims, comprises a group a short distance north of the Gem and Freighters' Friend, near the head of Gilson gulch. Here is a vein of ore trending east and west, which is also crosscut by the Newhouse tunnel. An incline shaft sinks 800 feet, from which drifts on the vein have been run at 100-foot stations. The principal work now in progress is on the drifts and stopes of the fifth, sixth and seventh levels. The vein walls are 4 to 7 feet apart, the material between them being partially decomposed quartz, clay and talc, supporting a well defined streak of lead and iron sulphide, which carries from 2½ to 3½ ounces gold and 3 to 5 ounces silver. The streak, however, is comparatively narrow. The eighth level has not yet been developed. At the bottom of the incline is a sump from which water is constantly pumped. In this mine the Schmucker air drill is in use—a view of one of the stopes, with drill in operation, being given herewith.*

E. D. Quigley, with whom various Eastern parties are interested, has charge of groups known as the Bellman, Brighton, Lead Belt and Mix—the first two named being small shippers. Mr. Quigley has also started a tunnel from a point west of Virginia canyon, having driven 375 feet.

In the Roberts mill the manager, J. G. Roberts, is making some tests on a vibrating, double-decked spiral plane concentrating table, built and patented by W. E. Wild and Howard S. Bailey. The work it does on the ores of the district, which are a lead and iron sulphide, is deemed very satisfactory by Mr. Roberts.

The Seaton M. & M. Co., under the management of J. J. May, perhaps ships the largest tonnage of any mine in the district at present, the ore being mostly smelting material.

The Alma Co., which has control of a group north of the Seaton, owns the Foxhall tunnel, which goes in 1300 feet, from the level of which a shaft will now be sunk. WASCOTT.

Idaho Springs, Feb. 20, 1901.

* See illustration front page.

Treatment of Tailings.

In the treatment of tailings by the direct-filling process, the vat that is filled with tailings from the battery is treated directly by cyanide, instead of the contents being discharged into another vat for treatment, the usual intermediate or settling vats being dispensed with. Before the cessation of work in the South African gold fields because of the war, there were two mines on the Witwatersrand where the successful treatment of tailings by the direct-filling process was being carried on—the Jumpers G. M. Co. and the New Kleinfontein Co., Ltd. The following is a short description of the plant and method of treatment adopted at the latter mine during six months:

The plant consisted of two slime separators, nineteen treatment vats, four extraction boxes and nine solution tanks; the slime separators were of the ordinary spitzkasten or pointed box style, 6 feet square at the top, 6 feet deep. Of the nineteen treatment vats, thirteen were of 200 tons capacity, and six of 130 tons capacity each. Around the top of each vat was a launder, which carried away the overflow into the slimes race. The nine solution tanks had a total capacity of 636 tons of solution, and each was connected with the three centrifugal pumps worked from a motor that pumped the weak, medium or strong solutions onto the treatment vats. The pulp or tailings, after leaving the battery plates, was lifted by means of a tailings wheel into a launder, by which it was conveyed to the slime separators. The slimes from the first separator passed into the second, whereby a quantity of fine sand was saved that otherwise would flow away. About 15% of slimes were eliminated in the separators, and the remaining pulp run through launders into the treatment vats, which were previously filled with water. In the course of filling the vat, another 10% of slimes overflowed into the slimes race, so that the resulting tailings to be treated in the vat contained but a small proportion of slimes.

The vat was filled with tailings (sand) to within 1 foot of the top, when the stream was diverted into another vat.

The following table is a page from the logbook of the New Kleinfontein Co.'s cyanide works, which shows the exact method of procedure adopted at the works in the treatment of a vat of tailings:

VAT I. CHARGE I. CAPACITY 207 TONS.

Date Filling.	Time.	Test.	Tons.	KCy solution.
October.				
Wed., 6th..	1 p.m.	.....	Filling.	
"	2 a.m.	.....	Filled leaching dry.	
"	4 "	Acid	Alkaline wash, 20 lbs. NAHO used, do. ½ bag lime.	
"	9 "	Alkali'e	Preliminary solution, 0.16; KCY; 20 tons.	20
"	2 p.m.	.....	0.01 changed to weak box.	
"	2 "	.....	1st strong, 30 tons 0.3 KCy; 3 p.m., 20 tons; 7 p.m., 6 tons.	56
"	9 "	0 09	Standing under solution for 3 hours.	
"	12 p.m		Started leaching until 12 m.	
Thurs., 7th.	1 a.m	0.1	Changed to medium box, 3 a.m., 1.3; 6 a.m., 1.6; 9 a.m., 0.18.	
"	12 m.	0.2	Changed to strong precipitating box.	
"	12 "	.....	2″ strong, 30 tons; 0.3 KCy, 3 p.m., 10 tons; 6 p.m., 15 tons; 8 p.m., 1 ton.	56
"	8 p.m.	0.28	Standing under solution for 3 hours. Started leaching until 8 a.m.	
Friday, 8th.	8 a.m.	0.26	Medium, 20 tons; 12 m., 5 tons; 4 p.m., 8 tons; 8 p.m., 8 tons.	36
"	9 p.m.	0.2	Changed to medium; 12 p.m., 5 tons; 5 a.m., 10 tons; 12 m., 7 tons.	25
Sat., 9th...	3 "	1.8	4 p.m., 10 tons; 8 p.m., 7 tons; 4 a.m., 12 tons; 8 a.m., 5 tons.	34
Sun., 10th..	6 "	1.4	Weak, 5 tons; 12 p.m., 5 tons; 6 a.m., 5 tons; 12 m., 5 tons.	20
Mon., 11th.	6 a.m.	0.1	Changed over to weak	19
"	6 p.m.	0.9	5 tons; 12 p.m., 5 tons; 7 p.m., 5 tons; 12 p.m., 4 tons.	
Tues., 12th.	6 a.m.	.....	Leaching dry.	
Wed., 13th.	6 "	.....	Discharging.	
.....	.....	.....	.....	266

Amount of KCy used, 5.9 pounds per ton.

METHOD OF TREATMENT.—Each vat, after being drained of water, was treated with an alkaline solution to neutralize the free acid in the tailings formed by the decomposition of pyritic ores. As soon as the solution draining away was slightly alkaline, the treatment by cyanide solution was commenced. Various strengths of solution were pumped into the vat, each vat receiving during its course of treatment from 200 to 275 tons of cyanide solution. The length of treatment was six days and the amount of cyanide used 0.6 pound per ton of tailings.

PRECIPITATION OF GOLD IN THE EXTRACTOR BOXES.—The precipitation of gold from the solution coming from the treatment vats was effected by means of zinc shavings. A certain portion of the ore coming from the mine was of a rebellious nature, containing sufficient foreign metals to retard, if not prevent, the precipitation of gold by zinc. To counteract the effects of these foreign metals it was proved efficient in practice to set up a lead couple, and at these works this was effected by dipping the zinc shavings in a weak solution of acetate of lead, preparatory to being placed in the extractor boxes. In all cases it was found that zinc containing from 1% to 2% of lead gave the most satisfactory precipitation. By the use of acetate of lead a perfect precipitation was brought about, only traces of gold remaining in the solution after passing through the extractor boxes.

The zinc shavings were first placed in the zinc solution box, and afterwards transferred to the medium and thence to the strong. In the weak and medium solution precipitating boxes, the gold became plated on the zinc, and less zinc was destroyed than in the strong. The solution from the extractor boxes, containing only traces of gold, was returned to the solution tanks, where, if found necessary, its strength was made up by the addition of cyanide.

CLEAN-UP AND REDUCTION OF ZINC-GOLD PRECIPITATES.—The zinc was taken from the boxes at the semi-monthly clean-up, and washed by hand in an oblong wooden box; the washings then placed on a screen of 700-mesh, when all that would not pass the screen were replaced in the extraction boxes, together with the washed zinc. The product that passed the screens, consisting of gold in the state of a black slime and fine particles of zinc, was placed in a vat containing a filter bottom consisting of duck canvas placed over a wooden grating. This space beneath the filter bed was connected with a 2-inch pump, by means of which the excess of moisture in the slimes was drawn off through the filter bed, the solution thus drawn off being passed into one of the extraction boxes to prevent loss of very fine particles.

The slimes freed from excess of water were taken out and placed in another vat, having a capacity of about five tons; a 10% solution of sulphuric acid is gradually added, the whole mass being continuously agitated by means of a mechanical agitator.

The acid dissolved the zinc, and when the solution was accomplished and no more action took place the vat was filled with water, the agitator being kept stirring all the time. When the vat was full of water the agitator was withdrawn and the slimes allowed to settle for an hour. The water was then decanted off, the slimes taken out, dried and roasted in a furnace, care being taken that the slimes were not disturbed during the roasting so as to cause any loss.

The dried slimes before any acid treatment contained 4% of gold; after treatment this percentage was increased to 33% or 45%. The average fineness of bullion recovered was 847 gold and 60 silver, the base metals being principally copper and lead.

Of the pulp leaving the mill, 73% was recovered and treated in the cyanide works, and an actual extraction of 80% of gold was recovered from this, or 60% of the gold leaving the plates.

Among the advantages gained by the use of the direct-filling process was the smaller plant required. The cost of erecting eight settling vats, of 450 tons capacity each, including foundations, trucks, filter beds and piping, would be $30,000.

Interest on $30,000, at 10%.....	$3,000
Maintenance of settlers for twelve months, 10%...	3,000
Two extra shiftsmen in works, at $110 per month.	2,640
Discharging 192,000 tons of tailings, at 8c. per ton.	16,000
Total.....	$24,640

This is equal to a profit of 12 cents per ton, or 2% of the capital of the company, the actual working cost being 48 cents per ton, including general charges and maintenance.

THE Bethlehem Iron Company, South Bethlehem, Pa., in 1890 erected the largest steam hammer ever built, having a capacity of 125 tons falling weight. This was operated successfully for three years in the manufacture of armor plate, but when, 1893, a new type of this product was invented by H. A. Harvey, it was found that the hydraulic press was better adapted for its manufacture, and this enormous tool, which, with all its accessories, cost in round figures a quarter of a million dollars, was immediately set aside, to be replaced at a similar cost by a hydraulic press, which to-day still remains the largest in the world. This is probably the most notable instance on record, on account of the great expense involved, of the substitution of a more efficient tool for another, the normal life of which had only just begun.—Engineering Magazine.

Box Sluices.

A box sluice is constructed of rough boards 1½ inches thick and 12, 14 or 16 feet long. The bottom boards are sawn 4 inches wider at one end than at the other, so that the narrow end of one box telescopes into the broad end of the next, throughout the series; and, beyond this fixing, no nailing or fastening is required. The maximum width of this box is never less than 1 foot nor more than 5 feet, but is generally 16 to 18 inches, while the sides are 8 to 10 inches high. The line of troughs rest on trestles, and is so arranged that there is a descent, incline, or grade throughout the series. It is important that the sluice should be conveniently near the level of the ground, where the pay-dirt is shoveled in; and this consideration, therefore, has often a bearing on the choice of grade.

The length of the sluice varies with the consistency of the gravel, the fineness of the gold, the cost of the sluices, and the fall of the ground. It must be sufficient to complete disintegration and to save the gold. The length and grade necessary for these purposes may be adjusted by experiment. If, in the clean up, the lowest boxes yield much gold, an addition to their number is necessary; while, if they yield none, the length of the sluice may be shortened. The shorter the sluice the lighter the grade should be, as a high grade and rapid flow entail greater risk of the fine gold being lost. The grade of a sluice is measured by inches per box, or by the fall per hundred units of lengths, or in terms of the slope; thus a grade of 12 inches means a fall of 12 inches in a 12-foot box, unless otherwise stated, or the same grade may be expressed as 8.3%, or a slope of 1 in 12. For box sluices the grade is seldom less than 8 inches or more than 20 inches per 12-foot box. Box sluices can be fitted with riffles, false bottoms, drops, undercurrents, etc.

The amount of material washed is limited chiefly by the capacity of the men throwing in the pay dirt. When the height of lift is 4½ to 5 feet, 24 cubic yards will be a good day's work for four men, or, say, 6 cubic yards per man.

In some places, where for the most part the slope of the valleys is very gradual and the grade has consequently to be obtained by elevating the boxes on trestles, the sluices are necessarily short and usually under 100 feet. This has led to the development of a special type of sluice used for washing light sand. The sluice used in Siberia is thus described by Dr. Rose in his Metallurgy of Gold: The apparatus at Voltchanka, which may be taken as a type, consists of a head sluice and three secondary sluices, which, placed at right angles to the head sluice, leave it at different points and converge to a common center where the tailings are discharged. The head sluice begins at a height of 13 feet above the ground; it is about 90 feet long by 2 feet wide, and has a fall of about 1 in 14. The sands are dumped from wagons and shoveled into the sluice. After passing through a grizzly the gravel runs over a series of cast-iron cross bar riffles, which form a number of rectangular depressions—pigeon holes—in the sluice bed, by which disintegration is favored. The stream then flows over an iron grating, through which a part of it falls into the first secondary sluice, while the remainder continues its course over more pigeon-hole riffles. A second and a third screen open on to the other secondary sluices; and such of the gravel, chiefly small stones, as has not passed through the gratings is let fall into a hopper, and removed to the dumping ground. The secondary sluices (resembling the Californian undercurrents) are wider than the head sluice and have a steeper grade. The sands first pass over a number of transverse riffles, and then over about 30 feet of blanketing, the sluice being widened at the same time, and subdivided by longitudinal wooden partitions, and the grade being as much as 1 in 6, while small drops are introduced at intervals of a few feet. The third sluice has a more gentle inclination than the others. The tailings fall into a sump, are lifted by a bucket elevator into a hopper, and thence removed to the dumping ground. No mercury is used in the sluices, but the gray concentrates, or black sands, are treated with mercury in the Siberian trough, or on inclined tables. The output is about 500 tons of gravel per day of 13½ hours, the labor being furnished by twenty men and ten horses. The gravel contains from 12 to 15 grains of gold per ton. The gold, scales and plates, is chiefly found in the head sluice, where 70% is caught, 30% being caught in the secondary sluices. At Tchernaia-Retchka, however, where the gold is less finely divided, 97% was caught on the head sluice, and only 3% on the secondary sluices. The amount of water used at Voltchanka is about six times the weight of the gravel. The cost of construction of the works was 70,000 roubles, or about $34,000.

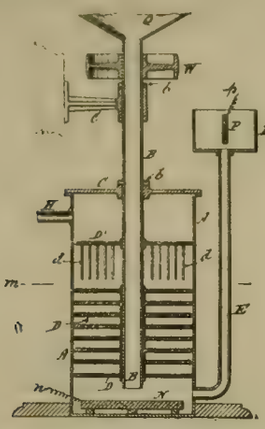
A MAN who advertises only once in a while does not get the full value of his advertising. Neither he nor his business ever benefits from the cumulative value of publicity. His each announcement may bear some fruit in proportion to its individual value, but one absorbs nothing of the good wrought by the other. His firm name is not kept constantly before the people. It is not unremittingly impressed upon consumers. Hence he is in a measure a new advertiser every time he advertises.

Mining and Metallurgical Patents.

Patents Issued February 19, 1901.

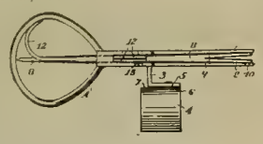
Specially Prepared for the MINING AND SCIENTIFIC PRESS

AMALGAMATOR.—No. 668,282; C. G. Collins, Woodmere, New York.



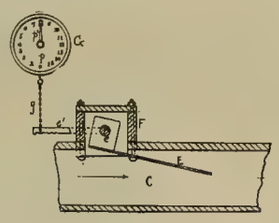
In amalgamating apparatus for continuously producing sodium amalgam and amalgamating ores under hydrostatic pressure, combination of stationary amalgamating tank A, adapted to contain mercury, rotatable stand pipe B, provided with perforated disks D, D, D′, cathode N, situated below end of supply pipe B, pipe E, opening into amalgamating tank A, in proximity to cathode N, considerably below mercury level, whereby ore introduced into mercury through pipe B is subjected to hydrostatic pressure, vessel F, connected with pipe E, above level of mercury in amalgamating tank A, and anode P, situated in vessel F, whereby continuous supply of sodium amalgam is formed at surface of mercury in pipe E, and diffused through mercury in tank A, by hydrostatic pressure and agitation thereof caused by submerging feed B and rotation of disks D, D, D′.

MINER'S CANDLESTICK.—No. 668,317; G. T. Parsley, Hornbrook, Cal.



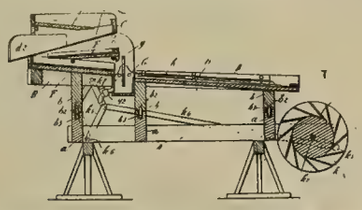
Combination in miner's candlestick of handle having parallel extensions, pointed arm and hanging hook having split ends, pivots by which they are turnably held between extension sides, lugs and notches whereby they are locked in operative position, bent arm projecting from one of the extension sides, thimble or holder for candle consisting of cylindrical elastic strip having elastic tongue through which pivot pin passes.

HYDRAULIC DREDGING APPLIANCE.—No. 668,342; E. Risley, Pleasantville, N. J.



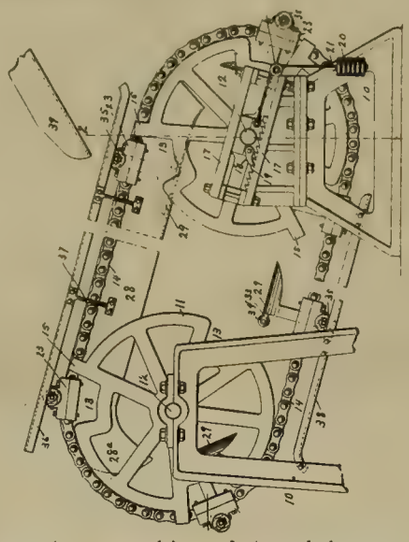
Hydraulic dredging apparatus provided with means for indicating choking of pipes, means consisting of pivoted blade within piping of dredging apparatus, dial and pointer indicating device outside piping connected to pivoted blade.

GOLD WASHING MACHINE.—No. 668,371; L. Franklin and J. Tonnar, Anaconda, Mont.



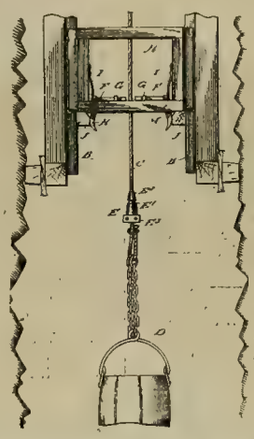
Machine for washing gold, comprising stationary base frame, rocking frame mounted thereon, provided with downwardly and backwardly directed chute forming part of apparatus mounted on frame for washing and separating gold, water wheel connected with rear end of base frame adapted to receive discharge from chute, shaft of which is provided at each end with crank, crank rod connected with each crank at opposite sides of machine, toggle levers connected with base frame and rocking frame, movement of wheel utilized for operating rocking frame.

CONVEYOR.—No. 668,378; M. Korth and W. Garrity, Franklin Furnace, N. J.



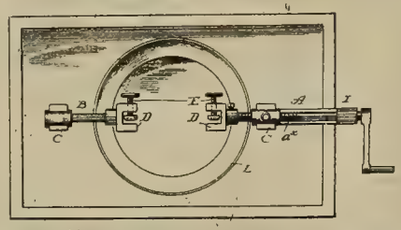
Apparatus comprising chute, chains movable along opposite sides of chute, cross arms clamped to chains, bent at center to approximately fit chute, guides at opposite sides of chute, rollers carried by cross arms engaging under sides of guides, buckets on cross arms to fit chute.

CROSS HEAD FOR MINE SHAFTS.—No. 668,464; J. T. Semmens, Bald Mountain, Colo.



Combination with hoisting cable and head thereon, of cross head, of locking bars mounted to slide on cross head and adapted to engage cable head, spring-pressed levers fulcrumed on cross head, connected with locking bars, stops adapted to be engaged by levers at time cross head reaches lowermost position in mine shaft.

AMALGAM SQUEEZING MACHINE.—No. 668,488; J. V. Coleman, San Francisco, Cal.



Machine for squeezing amalgam, comprising oppositely set standards, shafts supported in standards in horizontal position in line with each other, having gripping jaws on their adjacent ends, means for rotating and feeding forward shaft, means for regulating forward feed with respect to rotary motion.

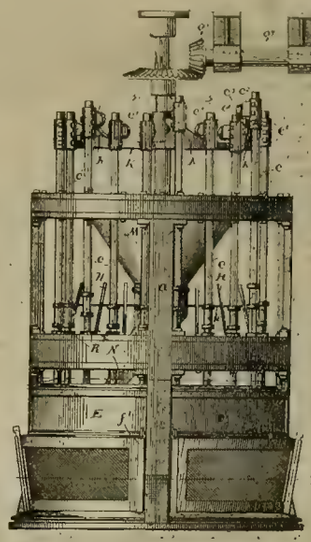
PROCESS OF MAKING TUNGSTATES.—No. 667,705; G. T. Holloway and H. W. Lake, London, England.

Extraction of tungsten compounds from tungsten ores, adding the ore in finely divided state to fused bath of silicate of alkaline metal, capable of combining freely with iron and manganese or lime in ore, whereby practically pure tungstate of alkaline metal is produced at one operation.

TRIPOD FOR ROCK DRILLS.—No. 668,493; J. J. Crippen, Denver, Colo.

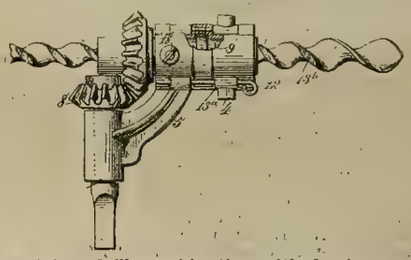
Tripod for rock drills, comprising U-shaped horizontal frame having ends facing forwardly, provided with bearings, depending brackets, formed at central rear portion with guide slot, tilting head having journals mounted in frame, locking member movable in slot, locking means on rear portion of frame to engage locking member and hold head in adjusted position, legs pivoted to depending brackets, each having adjustable bipartite coupling, legs mounted to swing forwardly and laterally of frame.

STAMP MILL.—No. 668,578; G. L. Gibson, Denver, Colo.



Combination with suitable framework, series of circularly disposed stamps having their stems vertically guided in framework, means for raising and dropping stamps, annular feed trough communicating with annular mortar, in which stamps operate, suitable ore hopper, rotating feed spout communicating at upper end with hopper, at lower end with feed spout, partial annular cover adapted to close any desired portion of feed trough, lower end of feed spout adapted to move over partial cover to be closed thereby, whereby flow of ore to portion of annular mortar corresponding to closed feed trough section may be interrupted, such portion of mortar temporarily inoperative.

MINING DRILL FOR COAL OR ROCK.—No. 668,593; A. Walker, Whatcheer, Iowa.



In mining drill combination with boxing of two hinged sections and annular groove formed in inner face, lining therefor having peripheral rib to prevent longitudinal displacement thereof, pair of studs formed integral with inner face of lining, adjustable wear block arranged in boxing, of twisted auger operating through lining and engaging studs, auger having each twist adjacent to drill end cut away in segmental manner, flattening one side thereof, bevel gear, means for operating gear.

AS THERE is practically no limit to the mineral wealth of this country, there can be no bounds set to the prosperous activity based on that wealth. In agriculture a bad season or stagnant market brings disaster; the best mercantile business is constantly menaced by competition; manufactories are keenly sensitive to market fluctuations, economic conditions and financial temper, while the gold of the mountains is eternal with wealth that carries no fluctuating value, the gaining of which enriches all and robs none save nature. Nature's bank has stood since the world stood; no run on it has ever shaken it; the crash of falling empires leaves it undisturbed, and it always pays rich dividends to those fortunate enough to hold shares in its bank.

MINING SUMMARY.

Specially compiled and reported for the MINING AND SCIENTIFIC PRESS.

ALASKA.

Late reports from Rampart state that a big strike is made on the Kuskokwim river, south of that place, and that a stampede to the new find is being made from Nome and other points.——Chief Clerk Hathaway of the U. S. Assay Office, at Seattle, estimates the output of Nome region for 1901 from $8,000,000 to $10,000,000.——The Nowell Co., operating at Berners Bay, near Juneau, has borrowed $150,000 in New York, with which it will pay off its indebtedness.

It is reported that M. J. Heney, who built the White Pass & Yukon Railroad, will build a line from Valdes to Circle City, a distance of 140 miles.——It is said that as high as $80 a day were rocked out last season on Gold bench, on the south fork of the Koyokuk.

ARIZONA.

GILA COUNTY.

Work is resumed on the United Globe mines at Globe under Supt. N. S. Berray. Fifty men are employed. A new shaft is being sunk on the Grey claim, 420 feet south and a little west of the old shaft. It will be a three-compartment shaft—two compartments each being 4x4½ feet and one 5x4½ feet. Machinery from the old Hoosier shaft will go in at the new shaft. ——Machinery for the Black Copper, near Globe, is going in.——Work is resumed on the Continental, of the Old Dominion properties.

GRAHAM COUNTY.

A 10-stamp mill will be put in at the Homestake group, on the San Francisco river, near Clifton.

MARICOPA COUNTY.

The second payment of $1 per share, or $65,000, on the Cobre Grande at Phœnix is made by W. C. Greene, president Greene Con. M. Co., at Phœnix.——The Lime Creek Copper Co. has begun operations on its property near Phœnix.

MOHAVE COUNTY.

At the Boulevard, near Kingman, a new hoisting plant is to go in.——The Schuylkill Co. will put in a concentrating plant at Chloride.——All working mines and mills near Chloride are preparing to use oil as fuel. A 10,000-gallon tank is in at Kingman, and oil is ordered from California.

PIMA COUNTY.

The Darius Green M. Co. is pushing work on its properties near Tucson.

YAVAPAI COUNTY.

The McCabe mine, which had been closed down several months, has resumed and is shipping a carload of ore per day. The production amounts to a larger tonnage than this, for the milling ore is being allowed to accumulate at the mine. The smelting ore being shipped runs from $60 to $80 per ton, the values being gold, silver and copper, the the last named running about 4%. These values are carried in a copper and iron sulphide. A new mill may be erected this season. Judge Wells, the manager, states that it has not yet been decided whether it were better to use stamps or crushers and rolls for the McCabe mill ores. The main point is to get good results from concentration. The McCabe shaft is 700 feet deep, the main ore production coming from the 500 and 600 levels. WASCOTT.

McCabe, Feb. 16, 1901.

A new body of ore, running $25 gold and fifty ounces silver to the ton, is opened up in the Bryan, near Prescott. ——An additional 100 feet will be sunk in the shaft of the Golden Fleece, same locality.——A new mill is to go in on the Mud Hole mine, near Prescott.——An option is given on the Lincoln group, near the Crowned King, Prescott. A 20-ton mill will go in if the deal goes through.

YUMA COUNTY.

The production of the La Fortuna, near Yuma, for 1900 is given as $1,386,000 in gold.

CALIFORNIA.

AMADOR COUNTY.

The shafts on the Wildman-Mahoney, at Sutter Creek, are down 1300 and 1000 feet, respectively.—— The shaft on the Lincoln, same locality, is down 1260 feet; on the 500-foot level a crosscut is run east and west about 200 feet north of the shaft. ——Operations at the Baliol, 1 mile east of Sutter Creek, are under way; Supt. W. H. Storms.——The shaft on the Potazuba, 1½ miles east of Sutter Creek, is down over 500 feet; levels are run at 100, 200 and 350 feet.——Two tunnels on the Treadwell, of the Treadwell-Guilana, 8 miles east of Sutter Creek, are respectively 700 feet and 300 feet long; mine is idle.——Operations on the Eureka, at Sutter Creek, are progressing satisfactorily under Supt. W. R. Thomas.

The suit of the East Central Eureka M. Co. against the Central Eureka M. Co. is transferred to this county for trial. The plaintiff alleges that the other company had been taking ore from its mine, the property of the two being adjacent.

BUTTE COUNTY.

Water is struck at 260 feet in the tunnel in the Bloomer Hill, near Berry creek. ——J. Marks is working the Cortez, near Enterprise.

CALAVERAS COUNTY.

The Alpine and Pajaro, near Washington Ranch, are bonded to E. C. Rigley and others for $20,000.——The main shaft on the Birdena, at Campo Seco, will be sunk an additional 100 feet.——The Mead G. M. Co. will sink a shaft on one of its properties near Rich gulch.——The Anglo-Saxon M. Co. is pushing work on its property near Rich gulch.——At Columbia, a $3000 pocket was recently found on the Bald mountain.——The Union mill, near Binum's, is being moved to the Sugar Pine, near Murphys. —— Drifting is in progress at the Buffalo, in Chili gulch, near Mokelumne Hill.——At the Melones, Robinson's Ferry, a raise is being run to connect main tunnel with upper workings; vein on property is reported 60 feet wide; ore is said to mill $4 per ton.

EL DORADO COUNTY.

Work will begin on the Gold Hill, near Bear creek.——The mill at the Hart, below Georgetown, is running steadily.——The Alhambra, in Kelsey district, is being opened up by J. Sipp of Auburn.——Operations on the Shaw, at El Dorado, are under way.——Operations at the Murray, at Pleasant valley, are under way.

HUMBOLDT COUNTY.

The Forks and Bloemer claims, near Forks of Salmon, are being worked by Manager Bennet.——Manager F. Gent will replace machinery at the Nordheimer, near Forks of Salmon.

INYO COUNTY.

A recent cleanup of Barnes & Anderson, operating east of Independence, returned $2300.

KERN COUNTY.

The Kinyon mill, at Randsburg, is running on ore from the Little Butte, near there, operated by Hammell, Graham & Lamb.——The Jennie B. group, near Slate Range, will be incorporated and developed on an extensive scale.——The Prosperity Oil Co., capital $1,000,000, and the Morning Star Oil Co., capital $100,000, are incorporated at Bakersfield.——Good progress is being made on the new mill at Randsburg.——The Yellow Aster mill, Randsburg, closed down for a few days last week, owing to a lack of fuel.——The Gray Gander Oil Co. is putting up its derrick No. 2, near Bakersfield.——The well of the Potts Oil Co., at Sunset, is down 950 feet.——The U. S. Oil Co., at Sunset, is down 460 feet.——A new rig is going up on 19, 29-28, owned by the Bolena Oil Co. ——The Lone Star Oil Co. has resumed drilling on 32, 12-23, near Bakersfield.——The Western Union Oil & Development Co., capital $1,000,000, is incorporated at Bakersfield.——The Dabney Oil Co., owning and operating 110 acres of land near McKittrick, has completed ten wells, and is sinking three more. The company has eight drilling rigs with which it expects to complete, on an average, two wells per month. Oil is 20 gravity, and tests show 55% illuminant, besides asphalt of good quality. Present wells are 2000 feet from the railroad, where the company has three storage tanks, a fall of 200 feet giving sufficient pressure to load cars.——The Eclipse Oil Co. has two rigs in operation at McKittrick.

LOS ANGELES COUNTY.

At Los Angeles the Nueva Camulos Oil Co. has completed its third well and is drilling No. 4.——Lowe & Williams are drilling their third well east of Western avenue.——The Southland Oil Co. is drilling its first well.——Progress is being made by the Congress Oil & Pipe Line Co. in drilling its well near Los Angeles; oil is lighter than when first struck.——The Lacey Oil Co. has completed its first well. ——The Crown Petroleum Oil Co. is drilling two new wells on Tolucca and Colton streets, Los Angeles.

MADERA COUNTY.

The Spangle G. M. Co., operating 8 miles from Raymond, will put in new machinery.——The mill at the Rex, at Grub Gulch, is crushing ore from that mine.——The Enterprise, near Raymond, will resume.

MONTEREY COUNTY.

Drilling for oil is in progress near San Ardo.

MONO COUNTY.

At the Standard Con. mill, Bodie, for the week ending Feb. 16, 375 tons of ore were crushed; average assay tailings, $4.95; concentrates produced, 1.02 tons; assay value, $134.61; amalgam produced, 1208 ounces; assay value per ounce, $2.29.

NAPA COUNTY.

Gold ore running $2.54 to the ton is reported opened up on Howell mountain, near Fine Crest, 6 miles from St. Helena.

NEVADA COUNTY.

The Hudson mine, below Rough and Ready, may soon have an extensive new plant of heavier machinery than that now in use.

The Yuba Con. M. Co., Supt. Bryson, is unwatering the Yuba, at Maybert.

The Tule Belle M. Co., operating on Cincinnati Hill, near Grass Valley, has levied an assessment of 2 cents per share, to sink the shaft an additional 100 feet.

A new hoisting plant will go in on the Posey, at Willow Valley.——The Silver Creek Land & Dev. Co., capital $600,000, is incorporated at Nevada City.

C. L. Loughridge, representing Eastern men, will examine the German, near Ormonde, which has lain idle for some years; should his report be favorable, the property will be bought and developed.

Operations at the Lecompton, near Nevada City, have resumed. —— A new 10-stamp mill for the Campbell, near Nevada City, Supt. J. C. Campbell, will go in.——The Bitner, at Spenceville, is bonded to Mr. Campbell of Nevada City and San Francisco men.——A strike of good ore is reported made at the 400-foot mark in the old Cambridge tunnel of the Gold Blossom, on Union Hill, near Grass Valley.——A 4-stamp mill will go in on the Golden Treasure, near Grass Valley; G. R. Tuttle, owner.——Operations at the Conlan, Grass Valley, are suspended, owing to flooding of the mine; as soon as unwatered, operations will resume; Supt. O'Connor.

ORANGE COUNTY.

Well No. 21 of the Santa Fe Oil Co. at Fullerton is flowing. Ten per cent of the output is a light grade oil, the remainder being water. The company is drilling well No. 24 and a rig is going up to drill well No. 25.

PLUMAS COUNTY.

The Clay Bank, near La Porte, has resumed operations.

RIVERSIDE COUNTY.

Work is resumed on the well of the San Jacinto Oil Co. at Moreno.

SACRAMENTO COUNTY.

The Ashburton M. Co. will put in new and heavier buckets at its dredger near Folsom. Operations will resume in June.

SAN BERNARDINO COTNTY.

A strike of gold and copper ore, running from 16% to 26% copper and from $40 to $60 per ton, is reported made on the Boner properties, 60 miles south of Needles.——A three-fourths interest in 380 acres of mineral land near Ontario is reported sold to D. E. Hayes of San Francisco for $50,000.

SAN DIEGO COUNTY.

The Victoria Oil Co. at Encinitas has resumed operations.——The well on the Monarch is down 1200 feet.

SHASTA COUNTY.

Work on the buildings, etc., of the new smelter for the Bully Hill mines, near De Lamar, is going ahead.——The Mt. Shasta Oil Co. has begun drilling for oil in Sand Flat, near Redding.

SIERRA COUNTY.

The Rising Sun, at the mouth of Slug canyon, near Downieville, is sold to J. W. Finney.——Brock, Budd, Godfrey & Jones have bought interests in and have bonded the remaining interests in the Swansea, Bush, Mammoth and Yankee placer claims at Chipps Flat. A company is formed to work the properties; J. Brock, manager.

SISKIYOU COUNTY.

The China M. Co., operating on Greenhorn, near Yreka, has its steam hoisting plants running steadily. —— Operations are under way night and day at the Cardoza, same locality.——The Helen mines, at Patterson creek, will be opened again by Oakland men.——The Sheba M. Co. will rebuild its mill and other buildings recently demolished by a snowslide.——Splengler Bros. are pushing operations at the mouth of Humbug, near Yreka.——Miners at Oro Fino, Quartz Valley and Mugginsville are preparing for a steady run.——The Downing, Henley district, is incorporated; a mill will go in, and work will be pushed.——Operations are under way at the Jillson, same district.——A mill will probably go in on the Wolverine, same district.——The La Flesh is running steadily.——At Gazelle, the new mill is nearly completed.——The Siskiyou Hydraulic mine, near Callahans, will resume operations.——A body of copper ore is opened up in the 100-foot tunnel of the Lythe, near Callahans. —— The Van Brunt, near Happy Camp, is running steadily.——Operations at the Gordon, same locality, are being pushed; superintendent and owner, Gordon.——Martin & Bailey are working the old Fort Goff, near Fort Goff, with 2000 inches of water. ——Ten men are employed at the Portuguese, above Fort Goff, in the Seiad district, and work is being pushed by Supt. Gilbert. —— The 10-stamp mill at the Cherry Hill, on Cherry creek, near Yreka, is being overhauled and repaired.——Fernandez & Co. are getting their hydraulic mine on Cherry creek, in shape for a run; the company expects to clean up $25,000 this season.

TUOLUMNE COUNTY.

The ditch of the Yosemite G. M. Co., near Hamilton, is damaged by recent storms, one piece of flume 500 feet long and 50 feet high being carried away.——At the Mazeppa, near Sonora, drifting is in progress on the 500-foot level; Supt. Moore.——A strike of rich ore is reported made on the 700-foot level of the Jumper. ——The Green, near Sugar Pine, is running.——At the Black Oak, Sonora, the 80-light dynamo is running steadily.——A new 10-stamp mill will go in on the Republican, Sonora. —— Herndon & Byrn are working the Ophir, at Deer Flat.——The Little Wonder, at Big Oak Flat, is being unwatered; Supt. Roberts.——Operations at the Starr King, near Carters, are closed down temporarily, owing to lack of wood.——Drifting is in progress on the 400-foot level of the Dreisam.

The Dead Horse, near Sonora, is in operation again.——A shoot of good ore is reported in the Mayflower, same locality; T. C. Winwood, Supt.——A new bed for the air compressor at the Grizzly will go in.——The Star King mill, Sonora, is running.——At the Draper, same place, sinking is progressing; most of the machinery for the new mill is on the ground; general manager, F. E. Houghton.——Operations on the Tanzy, near Sonora, are under way. ——The San Justo, on Carson creek, near Sonora, will be abandoned, owing to influx of water caused by striking an old shaft in bed of the creek.——The Big Seven M. Co. is granted judgment for $600 against W. B. Clement by the Superior Court at Sonora.

VENTURA COUNTY.

Six thousand acres of alleged oil lands near Santa Paula are reported sold to McKelvey and others for $150,000.

COLORADO.

BOULDER COUNTY.

The B. & M., at Ward, is making regular weekly shipments of smelting ore; the main shaft, now down over 800 feet, will go to a depth of over 1000 feet. Denver parties have bonded the Fox Hound, near Ward; the contract calls for twenty shifts per month.——At Sunshine the Penago M. & R. Co. will put in a new 50 H. P. boiler.——The India M. Co., capital $1,500,000, recently incorporated at Boulder to work the India at Magnolia; a new plant will go in.——Karf & Bruner, operating on thirty acres land, on South Spencer mountain, at Eldora, recently opened up ore running $16 gold to the ton. ——Work is resumed on the Norway, at Eldora.——Eighty-dollar ore is reported opened up on the Lady Grace.——High-grade ore is opened up in the 200-foot level of the Revenge, at Eldora.——The shaft on the B. & M., at Ward, now down 800 feet, will go to the 1000-foot level.

The Wall Street Gold Extraction Co. will erect a 100-ton electro-chlorination plant at Wall Street.

CHAFFEE COUNTY.

The New Year, at Granite, is temporarily closed down.——Work is in progress on the Columbine, at the head of Lost canyon, near Granite.——At Chalk creek the Latchaw M. T. & M. Co. will probably put in an electrical hoisting plant on its property on Raspberry mountain; an air compressor and drills are now going in at the company's tunnel.

The vein on the Mary Murphy at St. Elmo runs in places from 20 to 30 feet in width. The mine is equipped with tram, compressor and air drills.——The Pioneer and Mollie mines, St. Elmo, have run 750 tons of ore through the Pawnee mill.——The Red Raven Con. M. Co. of Marietta, Ohio, will extend its crosscut tunnel on the Red Raven, near Hancock. The tunnel is now in 200 feet.

CLEAR CREEK COUNTY.

The Senator, near Dumont, will resume operations.——Fifteen new stamps will go in at the Kokomo Pioneer Co.'s mill, at Idaho Springs.——The shaft on the Minot is down 400 feet; high-grade ore is running about $100 to the ton.——A recent shipment of ore from the Santiago, at Argentine Pass, milled 4½ ounces gold, 12 ounces silver and 15% lead to the ton.

A strike of rich ore is reported in the upraise from the tunnel level of the Griffith No. 1, on Griffith mountain, near Georgetown. The vein is 18 inches wide and the ore assays 25% lead, 136 ounces silver, 6% copper, with a little gold, to the ton.

EAGLE COUNTY.

A 35 H. P. engine will go in on the May

Flower, near Grand river; the incline, now down 1500 feet, will be continued.

GILPIN COUNTY.

The new 100 H. P. double engine hoisting plant of the Gregory-Buell Con. M. & M. Co., at Central City, is placed on its foundation, latter being 20x20 feet and built of solid masonry.——The Pain Killer, Black Hawk, after lying idle thirty years, is being operated by Shear, Snedaker & Giroux.

GUNNISON COUNTY.

Good ore is opened up in the 140-foot shaft on the Dillen group, 6 miles south of Gunnison.——A vein of good copper ore is opened up in the Hoffman tunnel, on Crystal mountain, near Gunnison.——Work is in progress on the A. E. Reynolds property, near Pitkin.——The Silver Basin shaft, now down 200 feet, will be continued an additional 300 feet.

HUERFANO COUNTY.

Assays of ore from property near La Veta, owned and operated by A. H. Edmiston, of same place, give 24.8% copper and three ounces silver to the ton.

A second power drill goes in at the Eagle Plume, near Walsenburg; Supt. Murry.——A strike is reported made on the Oregon, in North Arastra gulch, near Walsenburg, owned and operated by Houck, Martin & Fullenwider. A shaft is being sunk and ore will be treated at the Claytonia mills.——G. Hurd, operating in Block gulch, near Walsenburg, is driving a tunnel. A ledge 12 feet wide was recently opened up at a depth of 200 feet.——Work is going ahead at the Utopia, same locality.

LAKE COUNTY.

The greater part of the zinc mined in and around Leadville is shipped to Vieille Montague, a strip of neutral territory between France and Germany, where zinc mining has been carried on for centuries.——The Wad Walo M. Co., which recently bought the Eclipse, near the Little Johnny, Leadville, is sinking a shaft on the property to the 900-foot level; F. C. Rantchler, manager.——A strike is reported made in the Bison, at the head of East Fourth street, Leadville; G. F. Canipion, manager.

OURAY COUNTY.

The Calliope-Dexter, near Ouray, is reported sold to H. Schumacher and J. A. Arbogast, of Chicago, Ill., for $220,000; a 40-stamp mill will be put in shortly, and other improvements made; sixty men will be employed; contract calls for work to begin by June 1st.——Work on the Governor, in Sneffels district, is progressing; a shipment of ore will be made April 1st.

PARK COUNTY.

Work is begun on the ditch of the Cincinnati Placer Co., at Alma.——Ore running $50 to the ton is reported in the Smith-Orphan, Alma.——The Wheeler, at Alma, is reported sold for $50,000.

SAN JUAN COUNTY.

A strike of 4 feet of good ore is reported in the Esmeralda in Minnie gulch, near Silverton.——Denver men have bought the Crown Prince and Liverpool claims in Prospect basin, near Silverton.——An electric drilling plant will go in at the Henrietta, near Silverton.

SAN MIGUEL COUNTY.

The old mill at the Smuggler, near Telluride, will have ten additional stamps.——The tunnel in the Pennsylvania is now in 3000 feet.——The Liberty Bell is turning out about 300 tons of ore per day. About 190 men are employed.——The new 2000 H. P. power station at Vance Junction is running successfully. Power is being supplied to ten mills.

SAGUACHE COUNTY.

The Banner M. & M. Co. of Philadelphia, Pa., has bought three claims north of Crestone townsite for $20,000. A 1600-foot tunnel is being driven. Picked samples of ore assay from $40 to $500 per ton.

SUMMIT COUNTY.

The main drift on the Scepter and Tom Corwin mines, on Democrat mountain, near Georgetown, is in 2000 feet. A crosscut is being run at the 1440-foot mark to cut the Astor lode at a depth of 800 feet below the lowest level. Work on the new tramway and ore bins is in progress. The bins will have a capacity of 600 tons. Thirty-five men are now employed. Another short tram will go in later on. A concentrating mill with a daily capacity of 100 tons will be built immediately; Red Oak M. Co. operators.

TELLER COUNTY.

The total effective compressor power at the Independence, Victor, will operate seventy drills, the new 30-drill compressor now being in place. The shaft, now down 900 feet, will go to the 1500-foot level.——A strike is made in the west crosscut on the 100-foot level of the Arno, on Anaconda townsite, near Cripple Creek. The ore runs $30 to the ton.——Two 1000-gallon tanks are attached to the cage in the Elkton at Cripple Creek, to take water out of the two lowest levels. It is estimated that there is enough ore in and above the 600-foot level to keep operations going.

Senator E. O. Wolcott has an ore body in his mine, the Last Dollar, 14 feet between the walls. The foot wall is granite, the hanging wall phonolite, which for 15 inches carries a value of from one and a half to three ounces gold.——Returns from the first shipment of ore made from the recent strike on the 350-foot level of the Columbia at Cripple Creek show that the ore ran $50 to the ton.——The Buffalo & Cripple Creek Tunnel Co. will sink a 500-foot winze from the north lateral of the main tunnel of the Orizaba. The winze will be 5x9 feet in the clear. When completed the bottom of the winze will be 800 feet below the surface. The main tunnel is now in 1100 feet. An 800-foot lateral is driven north at the 1000-foot mark. The tunnel is double-tracked and equipped with an air compressor.

IDAHO.

ELMORE COUNTY.

The Baltimore, near Atlanta, is being operated by Lynch, Olsen & Scholl. The ore runs $65 to the ton.——Operations on the Tahoma, same locality, are under way. In No. 1 and No. 2 tunnels a good body of ore is blocked out.——The Golden Nugget is now being operated by S. H. Walby. The ore runs about $11 gold to the ton.——Frankie, Lange & Lape Bros., operating the Dewey, near Atlanta, have spent $10,000 upon the property. A 5-stamp mill was put in some time ago.——Work on the Webfoot is under way and ore being piled up for milling in the spring.——The Jessie Benton and Moultrie claims are being worked by N. Drake. The ore runs $50 to the ton.

SHOSHONE COUNTY.

The tunnel is being run on the Mammoth, near Wallace, to cut the ledge.——Below Gem, the tunnel on the West Bell will cut the ledge by May 1.——The second tunnel now being run on the Humming Bird, near Wallace, will cut the ledge 225 feet below the point where a strike was recently made.——Near Burke, the crosscut tunnel on the Sonora is 1250 feet long; drifting is in progress.——The Kincanno mine and 10-stamp mill, 6 miles east of Murray, are sold at Sheriff's sale to R. R. & F. B. Steen for $4517, latter being amount of judgment and costs awarded in their case against the Granite G. M. Co.

MICHIGAN.

HOUGHTON COUNTY.

The annual report of the Quincy M. Co. for 1900 shows the following figures:

Average number men employed	1,366
Average number miners employed	433
Wages of miners per month	$62
Yield mineral per fathom, lbs	512
Yield refined copper per fathom, lbs	391
Total ore mined, tons	650,545
Total ore hoisted, tons	590,166
Stamp ore treated, tons	558,723
Mineral from stamp mill, lbs	13,818,830
Mineral from ore houses, lbs	4,672,919

MONTANA.

FERGUS COUNTY.

Reeder, Harmon & Williams, operating the Pheasant of Ruby gulch, 7 miles from Lewistown, have ore running $82.40 to the ton. A cyanide plant may be put in.

GRANITE COUNTY.

The yield of the sapphire mines, now being worked on the west fork of Rock creek, 35 miles southwest of Philipsburg, for the year 1900 is given at 200,000 carats of rough crystals, 1200 carats being fit for cutting.

PARK COUNTY.

Livingston reports a gold strike in three of the ten claims of the Milwaukee-Montana Co., free milling quartz knit together with native wire gold, $19 to $300 per ton.

SILVER BOW COUNTY.

Progress is being made on the new smelter going in on the Anaconda, at Butte; the old smelter will be rebuilt and fitted with modern machinery; it is reported that the fire in the mine is extinguished and that good ore is now being taken out of the burned district.

NEVADA.

HUMBOLDT COUNTY.

At the National at Unionville ore running 350 ounces silver and $50 gold to the ton is reported. The property is owned by Surveyor-General Kelley.

LINCOLN COUNTY.

The Woodbutcher, at Blind mountain, near Pioche, is reported sold to Vietti & McDonald for $5000.

WHITE PINE COUNTY.

The new mill of the Ely M. Co., at Ely, is ready to start.

NEW MEXICO.

BERNALILLO COUNTY.

Santa Fe men have bought a one-third interest in the Little Mollie, near Bland.——The Monster, South Cross, Smuggler, Corenna and Sunny South claims, near Bland, may be sold to New York men; should deal go through, a reduction works will be built on Washington hill.

COLFAX COUNTY.

Rich strikes are reported made in the Bobtail and Senate mines, near Elizabethtown; ledge is said to be 18 inches wide, ore running $500 to the ton; properties are owned by the Smithfield M. Co., Pittsburg.

The Baldy tunnel is in about 200 feet; the company will put in a new plant and will drive the tunnel to the 3000-foot mark.

GRANT COUNTY.

The Whitney G. M. Co., capital $500,000, is incorporated at Silver City.

Operations are progressing satisfactorily on the Dover, at Pinos Altos.——The Hanover is shipping concentrating ore to the Empire mill.

SANTA FE COUNTY.

The new 150-ton per day lead concentrator recently built by the New Mexico Lead Co. in the San Andreas mountains, near Ploma, is running successfully; concentrates run up to $12 per carload; an air compressor and drills will go in.

The Colorado Fuel & Iron Co. is laying a pipe line from its works at Madrid to the new hard coal mine, 1 mile distant, to supply compressed air for the hoisting and other machinery; this is being put in as an experiment to obviate, if possible, the necessity of putting in a battery of boilers at the mine; a railway is being built to carry coal to the breaker.

OREGON.

BAKER COUNTY.

Near Baker City, the Quebec mine, Carr & Farris, will build a 10-stamp mill.

DOUGLAS COUNTY.

C. R. Ray of Gold Hill is pushing work on the Gold Bug Extension, 18 miles from Glendale.

JACKSON COUNTY.

Operations are in progress on the Dixie Queen, on Foots creek, near Gold Hill.——McKee and others of Portland, who recently bought the Anderson, near Gold Hill, will begin work immediately; later they will put in a mill.——Work will be resumed on the Lost Cabin, near Gold Hill.——All giants on Foots creek are running steadily under full heads.——There are five stamp mills running steadily within a radius of 8 miles of Gold Hill, which crush ores from about twenty-five mines in the same locality.——There are said to be 100 placer claims in operation near Gold Hill.——Operations are progressing on the Bill Nye, near Gold Hill. A new strike is reported made, the vein being about 3 feet wide and the pay streak about 10 inches in width along the hanging wall; the shaft is down 150 feet.——A company is incorporated to work the Klondike, on Ash creek, near Hornbrook, Cal.; a mill will go in immediately, and operations at the mine will be pushed.——Hydraulic operations are resumed at mines on the Klamath river, near Hamburgh, with the exception of the Siskiyou, which recently lost over a mile of ditch and fluming; Supt. Sharpegger expects to resume about March 1st.——Work on the Opp, near Jacksonville, is progressing favorably. Preparations are under way to put new machinery in this spring.

JOSEPHINE COUNTY.

Work on the Golconda, on the Applegate river, near Provalt, 12 miles from Grants Pass, is under way under A. C. Taylor, Pres. Golconda M. Co. The drift on the 130-foot level is in 120 feet; the vein averages 2 feet in width, ore assaying $12 per ton. The major part of these values is in sulphurets, with a few dollars to the ton in free gold.——A recent clean-up at C. E. Wickstrom's claim, on Pleasant creek, near Grants Pass, gave twenty ounces of gold.——The Mt. Fielder (quartz), near Woodville, is bonded to Olsen & Parsons of Seattle, Wash., for $4500; there is a 300-foot tunnel on the property.——The old Bennett (quartz), on upper Jump-off-Joe, is now being operated by M. Carter of Wimer.——Burns & Markham, operating the Burns & Markham, on Limpia creek, near Grants Pass, have sunk a 54-foot shaft and are now crosscutting at that depth.——It is reported that an offer is made to put in a 200-ton smelter at Grants Pass, providing 200 tons of ore per day are guaranteed by mines near there.——Reports from Gold Hill state that a body of $1000 ore is opened up in the Lucky Bart, near there.——Work is in progress on the Moon, on Galice creek, 25 miles from Grants Pass, owned by C. R. Ray of Gold Hill.

SOUTH DAKOTA.

PENNINGTON COUNTY.

A new hoist and pumping machinery will go in on the Golden Slipper, near Hill City.

The Reinbold M. Co. of Custer and Omaha, Neb., will erect a plant for the treatment of manganese ore at Omaha.

UTAH.

BEAVER COUNTY.

Work is resumed on the Old Talisman, in Star district, near Milford, operated by Kohl & Murdock of Milford. The vein carries high-grade silver and lead values.——J. T. Kelley of Shauntil, operating the Anvil and Magnolia mines, near there, will begin shipping ore.

BOX ELDER COUNTY.

The Golconda M. Co., Manager Joseph, has let a contract for 50 feet of additional work on No. 1 ledge of the Golconda at Park Valley. The company is drifting on No. 2 ledge preparatory to erecting a mill.

IRON COUNTY.

The Stateline G. M. & M. Co., capital $30,000, is incorporated at Stateline to work the Malburn, Marion and Bob Clough claims, near there.

JUAB COUNTY.

The New York Grant M. Co., capital $500,000, is incorporated to work the Grant group, in Johnson's Peak district: W. Babcock, manager.

The North End at Eureka, Tintic district, is sold to the Raymond M. Co. for $15,000. The property will be developed by a drift from the main shaft of the Raymond. The latter, now down 800 feet, will be continued to the 1000-foot level, at which depth a crosscut will be run.——Work on the Victoria at Tintic will begin again. The property will be opened through a north drift from the Grand Central on the 900-foot level.——Ore is opened up in a winze on the Lower Mammoth at Tintic.

SALT LAKE COUNTY.

The furnaces of the new Highland Boy smelter at Bingham, Supt. R. White, are treating 465 tons of ore daily.

The West Mountain Copper Co. of Bingham will begin work there.——The Red Wing, Bingham, is shipping ore.——Supt. M. D. Murphy reports the Dalton & Lark drain tunnel at Bingham in 200 feet, and that progress is being made at the rate of 5½ feet daily. Ten men are employed. The tunnel will be run to the 5800-foot point.——The Highland Boy at Bingham, Supt. Channing, is shipping over 400 tons of ore daily.——The Dewey mill in Bingham canyon, near Bingham, is running on Northern Light ore.

TOOELE COUNTY.

The Sunshine mine and mill in Camp Floyd district, near Sunshine, are sold to G. C. Moore and Eastern associates for $300,000. Work will begin immediately and the mill will be enlarged.——The Con. Mercur at Mercur shipped its January output of gold bullion to the sub-treasury at New York.

WASHINGTON COUNTY.

The St. George M. Co. of St. George made the final payment of $55,000 on the Dixie group of mines and smelter, near St. George, on the 23rd ult.

WASHINGTON.

FERRY COUNTY.

The Last Chance group, near Keller, is bonded to G. Holbrook of Spokane.

OKANOGAN COUNTY.

The Lakeview tunnel, on Mount Elleham, near Loomis, is in 265 feet.

SPOKANE COUNTY.

The Ballarat Copper M. Co., capital $100,000, is incorporated at Spokane.

STEVENS COUNTY.

The Globe Fields M. Co., operating in the Flat Creek mining district, near Ryan, 15 miles from Northport, are pushing work.

WYOMING.

ALBANY COUNTY.

The Rambler (copper), 25 miles southwest of Laramie, is reported sold to an Eastern company for $110,000.

CARBON COUNTY.

A Boston company will operate the Charter Oak, near Grand Encampment; ore is said to carry 4% copper and $3 gold to the ton.——The Mammoth Copper Co. will drive a 900-foot tunnel on its property, 2 miles north of the Ferris Haggerty, near Battle Lake.——Work on the new smelter at Grand Encampment is progressing.

FOREIGN.

AUSTRALIA.

The report of the Broken Hill Proprietary Co., Ltd., of New South Wales, for the half year ending Nov. 30, 1900, shows that during the time stated there were

treated 129,951 tons ore, yielding in round numbers 20,000 tons lead, 337 tons antimonial metal, 2,780,937 ounces fine silver, 3427 ounces fine gold. The price received for the silver averaged 2s 6d per ounce; lead, £16 16s per ton; copper, £72 10s per ton; spelter, £19 per ton. The company has secured a reduction in the cost of water at Port Pirie—now paying 2s per 1000 gallons, instead of 6s, as formerly.

BRITISH COLUMBIA.

The Dominion Government has decided to open an assay office in Vancouver, at which gold will be purchased from returning miners at its full value, in the same manner as during the past season it has been purchased at Seattle for the United States Mint.

On the Eclipse, on Fish creek, Lardeau, ten men are employed; ore is a silver-lead and assays $80 to the ton.——A tunnel is being driven on the Black Warrior group, 9 miles from Ferguson; it is now in 210 feet, and is expected to reach the ore chute in the next 70 feet.——The Great Northern group, north of Trout lake, Lardeau, is bonded to A. B. Clabon, of Rossland, representing Eastern Ontario men, for six months.——The ledge in the Iron Cap, of the McDonald group, near Windermere, is reported cut in the 400-foot crosscut tunnel.——A tunnel is being run on the Bugaboo group, 18 miles from the Columbia river, Windermere district.——The St. Eugene concentrator, at Moyie, Southeast Kootenay, is running.——Ore from the Big Swede, Kimberley, carries 10% lead, with values in gold and silver.——Operations on the Wonderful, Slocan, are suspended temporarily. —— The Surprise, in McGuigan basin, has seven men working.——The Prescott group, near Silverton, is bonded to C. C. Bennett, of Vancouver, representing a company; work is now under way. ——At the Pontiac, on Woodbury creek, operated by C. J. Caldwell, of Kaslo, three tunnels are being run to tap the ledge.——The Rambler-Cariboo is shipping 200 tons of ore monthly to the smelter; No. 3 tunnel, now in 1600 feet, will be driven 2000 feet farther; a crosscut will be run from the 1500-foot or main level to cut showings of dry ore and galena which have been opened up in several places.——The stamp mill at the Waterloo, at Camp McKinney, will be started March 15th.

The Rosebery group, of the Carnes Creek Con. M. Co., between the north and south forks of Carnes creek, north of Revelstoke, is developed to a depth of 300 feet; ore is said to run $1 to $80 gold, 40 ounces silver and 5% to 20% copper to the ton.——The Standard group, owned by the Prince M. & D. Co. of Revelstoke, consists of nine claims; ore runs $1 to $4.35 gold, 24 cents to $6 silver and from 5% to 23% copper to the ton. Four tunnels are driven on the property.——From August 21, 1900, to February 1, 1901, the Granby smelter at Grand Forks treated 81,000 tons of ore, which produced 2700 tons of 50% matte; the present capacity of the plant is 600 tons ore per day. It will be doubled before May 15th.——Good ore bodies are opened up on the 250 and 350 foot levels of the Green Mountain, at Rossland.——At the Spitzee, the shaft is down 63 feet.

KLONDIKE.

It is estimated that Lippy's claim No. 16, on El Dorado creek, near Dawson, will be worked out at this season's cleanup. ——It is reported that Gov. Ogilvie will resign.

A strike of rich ore is reported made near Lepine creek, within 15 miles of Dawson, ore assaying from $36 to $84 to the ton; ore is said to be free milling.

Publications Received.

"California Miners' Association Report of 1900 Convention." This is an excellent idea, finely carried out. It is a handsome book of 255 pages, well illustrated, being an exact verbatim account of the proceedings of the ninth annual convention of the California State Miners' Association, held in San Francisco last November. It gives in detail all that was done, including all debates, resolutions, committee reports, etc., and, next to having been there, any one reading it could not have a better idea of just how the California miners transact their annual deliberations. A copy will be sent by the secretary, Mr. E. H. Benjamin, to every member of the association. Others desiring a copy should send him 8 cents for postage thereon. His address is 331 Pine street, San Francisco, Cal.

"Report of the Colorado Bureau of Mines, 1899–1900." Seldom has there been put in seventy pages matter of more practical value to miners in and out of the State of Colorado. The statements and suggestions it contains are of immediate interest, the statistics are accurate and up-to-date, and there is not a line of padding. It can be had from Mr. Harry A. Lee, Commissioner of Mines, Denver, Colo.

Personal.

L. H. BROWN of New York has gone to Siberia.

E. B. ANDERSON is nominated to be Surveyor-General of Utah.

R. G. BROWN has been re-elected manager Standard Con., Bodie, Cal.

S. P. CONGER of Selma, Or., has returned there from Denver, Colo.

J. E. BAMBERGER, manager Daly-West, Park City, Utah, is in New York.

J. R. DELAMAR of the Con. Mercur, Mercur, Utah, is in San Francisco.

M. WHELAN of Seattle, Wash., will be Supt. Anderson, near Gold Hill, Or.

CLARENCE S. KING has returned to California from a Mexican itinerary.

R. WALKERS of the Showers Con. M. Co., Diamond, Utah, is in San Francisco.

G. B. SESSIONS is the new superintendent of the West Argent mine, Stockton, Utah.

JAMES PARK succeeds the late Prof. Ulrich as director of the School of Mines at Otago, N. Z.

FRED ZEITLER, vice-president California Miners' Association, has returned from San Francisco to Nevada county, Cal.

P. A. H. FRANKLIN (president) and M. P. Gilbert (manager), Blackbird Copper & G. M. Co., Idaho, are in New York.

W. B. DILLINGHAM has returned from San Francisco to Vladivostock, Siberia, to resume charge of quartz mining operations in the interior.

LEONARD HAMMOND CARVER of San Francisco has been appointed chief engineer of the McCloud River Electrical Power Co. of Shasta county, Cal., and is now in the country looking over the ground.

GEO. MITCHELL, general manager Greene Con. Copper Co., Sonora, Mexico, proposes to build a smelter, and narrow-guage road 6 miles in length. He also projects a broad-gauge road 42 miles from the mine to Naco, Arizona.

LEW E. AUBURY, W. L. WATTS AND WM. IRELAN are mentioned in connection with the appointment by Gov. Gage of State Mineralogist of California to succeed the retiring incumbent, Mr. A. S. Cooper, whose term expires this month.

J. K. CARPENTER has returned to Oakland, Cal., from Sumatra, where for eight months he was investigating mining propositions. He was one of the few saved from the wreck of the P. M. S. Co.'s China steamer, the Rio de Janeiro, which was lost a few miles from San Francisco on the 22nd ult. He lost all his papers and notes.

List of U. S. Patents for Pacific Coast Inventors.

REPORTED BY DEWEY, STRONG & CO., PIONEER PATENT SOLICITORS FOR PACIFIC COAST.

FOR THE WEEK ENDING FEB. 19, 1901.

668,551.—SLAT FASTENER—M. L. Akers, Ione, Or.
668,279.—PUNCHING BAG—W. C. Bean, S. F.
668,481.—SEWING MACHINE—C. H. Benoit, San Jote, Cal.
668,305.—CAN HEADING MACHINE—W. S. Case, Haywards, Cal.
668,488.—AMALGAM SQUEEZER—J. V. Coleman, S. F.
668,285.—BOOT CLEANER — F. Dayton, Portland, Or.
668,556.—CLOTHES WRINGER—F. H. Edmonds, Ridgefield, Wash.
668,307.—PULLEY — F. F. Fenlason, Seattle, Wash.
668,171.—FIREPLACE FRONT—E. J. Field, Spokane, Wash.
668,287.—DEGERMINATING WHEAT — J. Frey, San Miguel, Cal.
668,181.—CURTAIN FIXTURE — C. C. Haub, S. F.
668,375.—AIR SHIP — A. F. Hubbard, Simmler, Cal.
668,292.—VEHICLE TIRE—F. J. Johnston, Sacramento, Cal.
668,451.—ENGINE—J. D. McFarland, Jr., S. F.
668,536.—RAILWAY CAR — F. C. Millar, Tracy, Cal.
668,337.—LUBRICATOR — O. Newhouse, S. F.
668,317.—MINER'S CANDLESTICK—G. T. Parsley, Hornbrook, Cal.
668,343.—SAWMILL — A. E. Roe, New Whatcom, Wash.
668,320.—SOLDERING TOOL—W. A. Rose, Santa Rosa, Cal.
668,300.—INSULATOR—H. E. Waite, S. F.

Recently Declared Mining Dividends.

	Payable.
Eureka M. Co., California, $10,000	Feb. 25

Notices of Recent Patents.

Among the patents recently obtained through Dewey, Strong & Co.'s SCIENTIFIC PRESS U. S. and Foreign Patent Agency, the following are worthy of special mention:

MINER'S CANDLESTICK.—No. 668,317. Feb. 19, 1901. G. T. Parsley, Hornbrook, Cal., one-half interest assigned to J. W. Downing, same place.

This invention is for an improvement in devices for holding candles in mining shafts, tunnels and like places. It consists of a handle having parallel extensions, a pointed arm, and a hanging hook having split ends and pivots by which they are turnably held between the extension sides with lugs and notches whereby they are locked in operative position. A bent arm extends from one of the extension sides and there is a thimble or holder for the candle, having an elastic tongue between which the pivot pin passes, and an elastic arm extending tangentially from one end.

VEHICLE TIRE.—No. 668,292. Feb. 19, 1901. F. J. Johnston, Sacramento, Cal.

This tire is of the class of resilient tires used for vehicles and consists of an outer tube with a filling of light elastic material in transverse sections centrally pierced, and a binding rod running through these sections, with means for connecting the ends of the rod, and means extending from the ends of the rods through the rim by which these ends are adjusted from outside the tire.

CAN HEADING MACHINE.—No. 668,305. Feb. 19, 1901. W. S. Case, Haywards, Cal.

This machine is designed for placing the heads upon the ends of metal cans and consists of endless chains of segments adapted to grasp the cans between them, wheels or drums journaled with relation to each other, so that the two sets of segments will be brought together and caused to register and travel in a line between the receiving and discharge end and means for supplying can bodies and can heads simultaneously to the central and end portions of the segments.

REVOLVING CYLINDER ENGINE.—No. 668,451. Feb. 19, 1901. J. D. McFarland, Jr., San Francisco, Cal., one-half interest assigned to John Bruckman, same place.

In this invention the cylinders are mounted radially with relation to an axis about which they are revoluble, and the piston rods of the cylinders are connected with a second shaft which is eccentrically placed with relation to the first-named shaft, so that a reciprocation of the pistons in the cylinders is produced by their revolution around the two centers; means are provided for the admission and exhausting of the propelling medium, which may be steam, air or gas, and by means of sleeves upon the shaft with which the piston rods connect, the admission and exhaust passages which pass through the shaft may be made to connect with the hollow piston rods, and thence with the interior of the cylinders so as to propel the engine, and by a movement of the sleeves the engines can be reversed.

LUBRICATOR.—No. 668,337. Feb. 19, 1901. Oscar Newhouse, San Francisco, Cal.

This invention is designed to be used in connection with lubricating devices for axles and shafts, and particularly for the use of heavy lubricants or grease, such as are not sufficiently liquid to flow. The lubricant is contained in a chamber and a cap is so disposed as to be removed with relation to the chamber, so that when advanced it will force the lubricant out.

MACHINE FOR DEGERMINATING WHEAT.—No. 668,287. Feb. 19, 1901. John Frey, San Miguel, Cal.

This apparatus is designed to scour and remove the germs from wheat and like grains. It includes contiguous smooth-surface metallic disks, one movable with relation to the other, and each having pockets or pits with sharp edges or angles into which the grain may fall, with one end projecting, and in this position the edges of the pockets of the other disk act to cut off the tips or ends of the grain containing the germ, and at the same time to scour and cleanse the grain.

Obituary.

SENATOR EVARTS, who died in New York City on the 28th ult., was famous as the man who once got $250,000 for his legal advice in a New York City case. It consisted in answering "Yes" to a question, and the affirmative reply is said to have cleared his clients $2,000,000.

Latest Market Reports.

SAN FRANCISCO, Feb. 28, 1901.

SILVER—Per oz., Troy: London, 28⅛d (standard ounce, 925 fine); New York, bar silver, 61c (1000 fine); San Francisco, 61c; Mexican dollars, 50c.

The London Statist thinks that apart from the possibility of a great silver mining combination, and the effect on the price, there is the prospect that the price may gradually improve, as a result of the world's normal consumption. The Indian Government is obliged to purchase fifty million ounces annually and the demand for China will possibly be larger than hitherto. With the normal demand and the subsidiary coinage for trade purposes, the conditions warrant the opinion that silver will permanently command a higher level than witnessed in recent years.

COPPER.—New York: Lake, 1 to 3 casks, $16.87½; carload lots, 16.50; Electrolytic, 1 to 3 casks, 16.50; carload lots, 16.35; Casting, 1 to 3 casks, 16.50; carload lots, 16.35. San Francisco: 18. Mill copper plates, 20c; bars, 22@23c.

LEAD.—New York, $4.37½; Salt Lake City, $4.00; St. Louis, $4.20; Missouri lead, $4.32½ desilverized lead; San Francisco $5.00, carload lots; 5½c 1000 to 4000 lbs.; pipe 6¾, sheet 7½, bar 6c; pig, $4.70 @5.10. London, £14 12s 6d per ton= 3.17 cts. per lb.

SPELTER. — New York, $4.20; St. Louis, $3.75; London, £17 12s 6d per ton =3.82½ cts. per lb; San Francisco, ton lots, 5¼c; 100-lb lots, 6c.

ANTIMONY.—New York, Cookson's, 10c; Hallett's, 9½c; San Francisco, 1000-lb lots, 12c; 300 to 500 lbs., 13@14c; 100-lb lots, 15@18c.

IRON.—Pittsburg, Bessemer pig, $14.00; gray forge, $13.50; San Francisco, bar, per lb., 2.65c in small quantities.

STEEL.—Bessemer billets, Pittsburg, $20.75; open hearth billets, $21.75; San Francisco, bar, 7c to 12c per lb.

TIN.—New York, pig, $26.75; San Francisco, ton lots, 29c; 1000 lbs., 29½c; 500 lbs., 29¾c; less, 30c; bar tin, ℔ lb, 35c.

QUICKSILVER. — New York, $51.00 large lots; London, £9 2s 6d; San Francisco, local, $48.00 ℔ flask of 76½ lbs.; Export, $45.00

The yield of the Almaden, Spain, mines during 1900 is stated to have been at 30,612 flasks—about 1171 tons.

MAGNESIUM.—New York, $2.90 ℔ lb.; San Francisco, $3.75.

ZINC.—San Francisco, 5½c; slab, 5¾c; bar, 7c; zinc dust, N. Y., 8c.

BABBITT METAL.— San Francisco, No. 1, 10c.

SOLDER. — Half-and-half, 100-lb. lots, 18½c; San Francisco, Plumbers', 100-lb. lots, 15½c.

ASSAY LITHARGE.—San Francisco, 10c ℔ lb, small lots.

BISMUTH.—New York, ℔ lb., $2.25 50-lb lots; San Francisco, $2.50 to $2.75 lb lots.

PLATINUM.—San Francisco, crude, $17 ℔ oz.; New York, $18.20 per Troy oz

ALUMINUM.—New York, No. 1, 99% pure ingots, 35c; No. 2, 90%, 30c to 35c.

FERRO-MANGANESE. — Pittsburg, 80%, domestic, $62.50, large lots.

TUNGSTEN.—New York, ℔ lb., 95c; San Francisco, $1.15.

FERRO-TUNGSTEN. — New York, 37%, 32c; San Francisco, 65c (60%).

NICKEL.—New York, 50@60c ℔ lb.

PHOSPHORUS. — F. o. b. New York 50@60c ℔ lb.

POWDER.—F. o. b. San Francisco: No. 1. 70% nitro-glycerine, per lb., in carload lots, 15½c; less than one ton, 17½c. No. 1*, 60%, carload lots, 13½c; less than one ton, 15½c. No. 1** 50%, carload lots, 11½c; less than one ton, 13½c. No. 2, 40%, carload lots, 10c; less than one ton, 12c. No. 2* 35%, carload lots, 9½c; less than one ton, 11½c. No. 2**. 30% carload lots, 9c; less than one ton, 11c. Black blasting powder in carload lots, minimum car 728 kegs, $1.50 per keg; less car lots, $2 per keg.

CAPS.—3x, $5.50 per 1000; 4x, $6.50; 5x, $8; Lion, $9, in lots not less than 1000.

FUSE.—Triple tape, $3.60 per 1000 feet; double tape, $3.00; single tape, $2.65; Hemp, $2.10; Cement No. 2, $3.00; Cement No. 1, $2.65, in lots of 3000 feet and up.

CANDLES.—Granite 6s, 16 oz., 40s., 11½c ℔ set; 14 oz., 40s., 10c.

CHEMICALS.—Cyanide of potassium, 98%–99%, jobbing, 32½@33½c ℔ lb.; carloads, 30@31c; in 10-lb. tins, 40c; sulphuric acid, in carboys, 66% B, 2c ℔ lb.; soda ash, $1.90 ℔ 100 lbs. 58%; hyposulphite of soda, 2¾@3c ℔ lb.; blue vitriol, 5¾@6½c ℔ lb.; borax, concentrated, 7@8c ℔ lb.; chlorate of potash, 12@13c; roll sulphur, 6c; alum, $1.90@2.00; flour sulphur, French, 2½@ 2¾c; California refined, 1¾ @ 2c; nitric acid, in carboys, 8c ℔ lb.; caustic soda, in drums, 3@4c ℔ lb.; Cal. s. soda, bbls., $1.00; sks, 95c ℔ 100 lbs.; chloride of lime, spot, $2.50@2.60; nitrate of potash, in kegs, 8c; caustic potash, 10c in 40-lb. tins.

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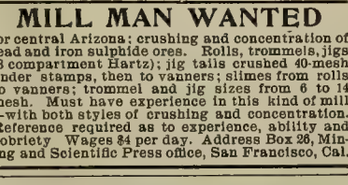

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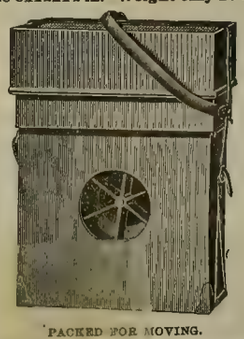

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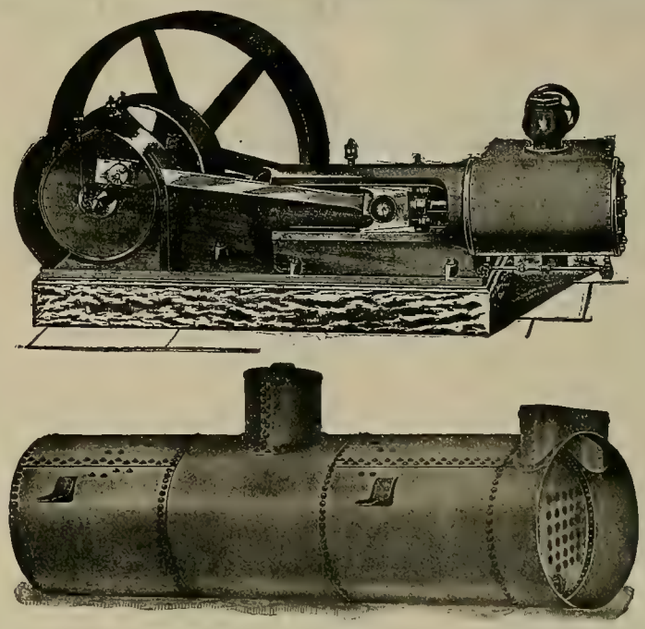

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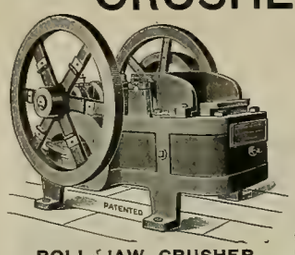

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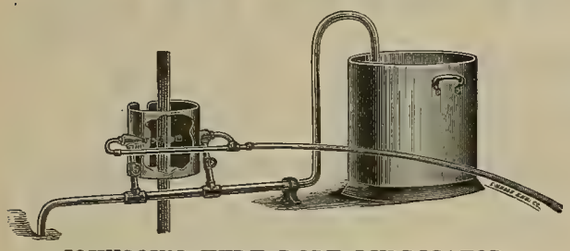

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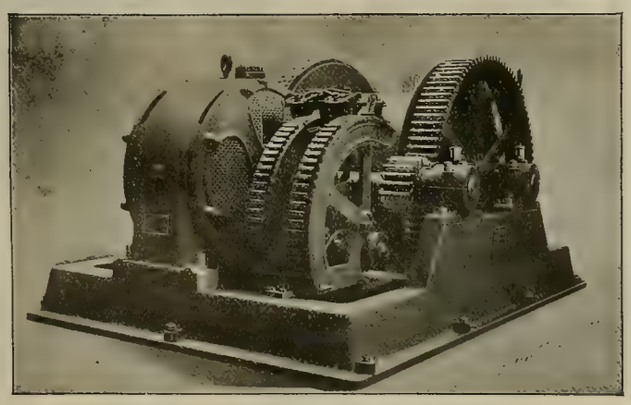

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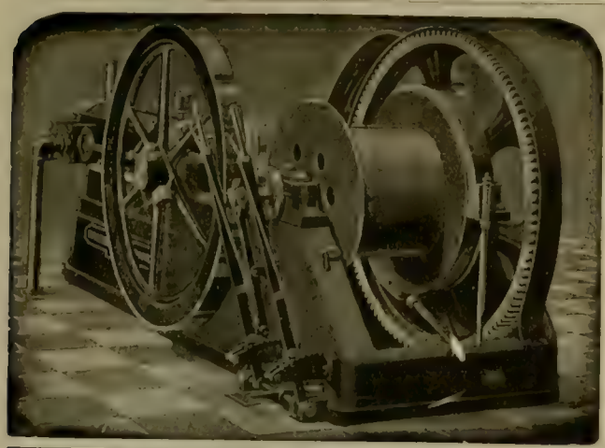

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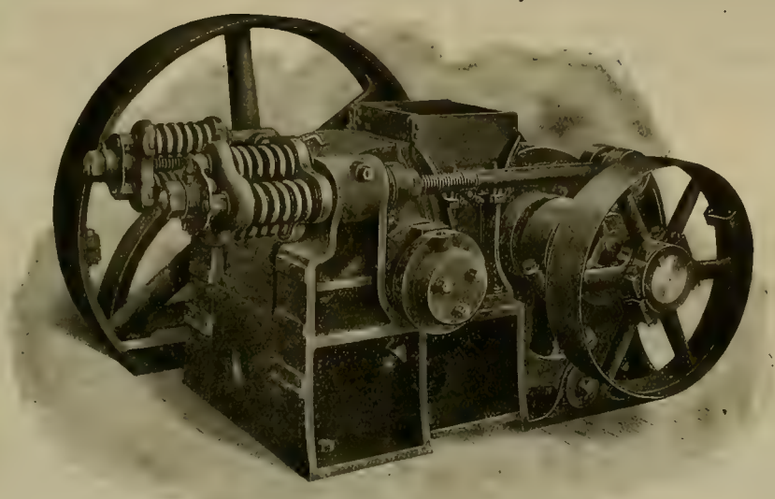

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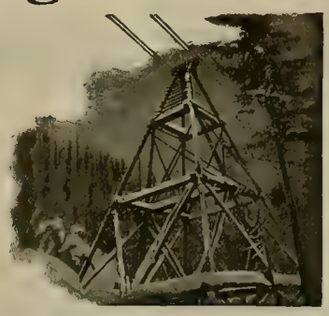

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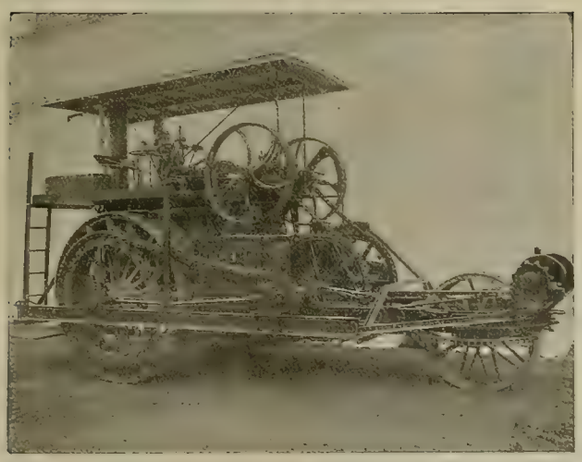

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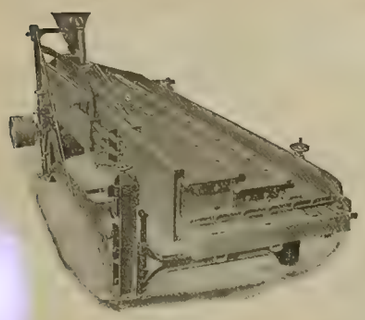

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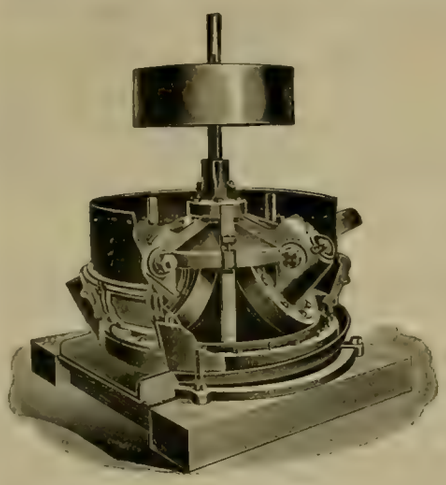

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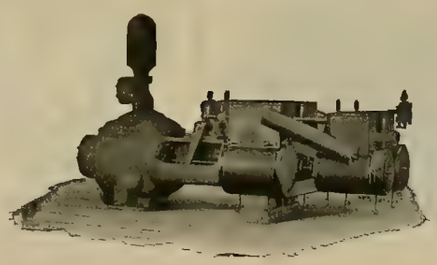

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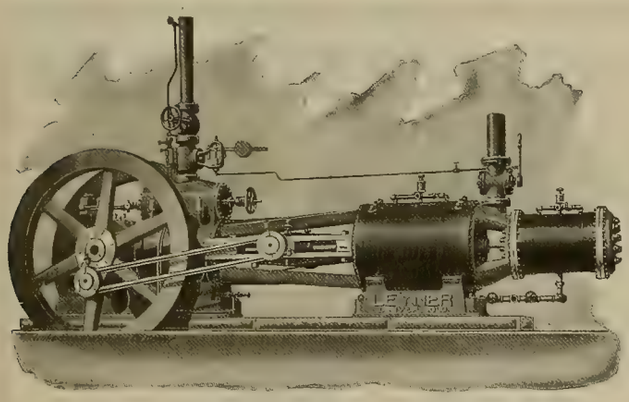

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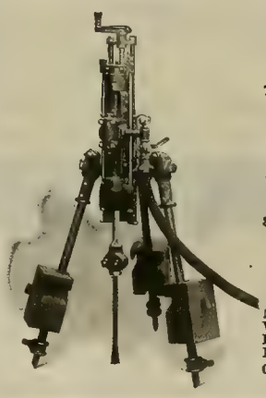

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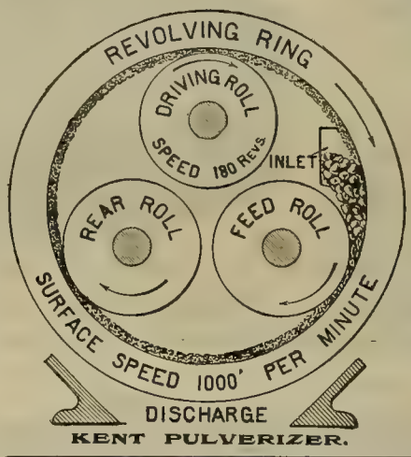


KENT PULVERIZER.

A Dry Pulverizer

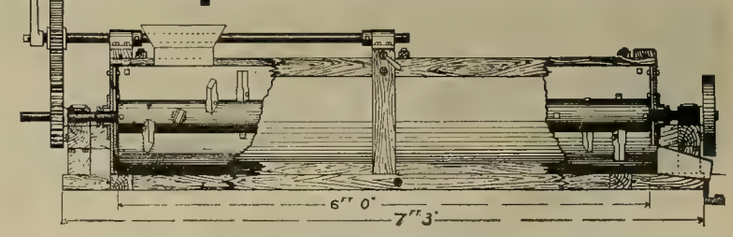
FOR ORES, CEMENT and HARD SUBSTANCES.

Equals a 50-ton stamp mill. Grinds to any mesh under 8.
No slimes, no choking. Takes any fineness of feed under 1 in.
No special foundation. No quartered belts.
No internal screens. Outside separation gives 100 per cent product most uniform and granular.
No oil in product. No stoppages for oiling or adjusting.
Can be used wet. Can be moved on a truck.
Guaranteed for one year. Free new for worn out parts.
Little wear, no duplicate parts, no breakdowns.
Cost ¼ to 1-10 of any installation of same capacity.
Takes only one-half the horse power. Is automatic.

For Particulars and Catalogue

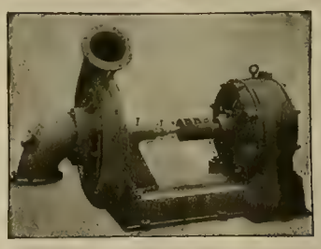
KENT MILL CO., 5 Beekman St., NEW YORK.

THE SNODGRASS HAND POWER COMMON SENSE PULVERIZER & CONCENTRATOR.



This Hand Power Machine is built on the same general principle as the regular machines, only being smaller in size and capacity. While this is intended to be run by hand power, it can easily be changed for steam or gasoline by simply putting on the pulley in place of the gearing. This has a capacity of 1½ to 2 tons per hour This is just the machine for working at Cape Nome and other places where it is difficult to procure wood, coal, or gasoline for power. It requires but a small amount of water, and a pump can be attached, so that one person can pump the water as well as run the machine. It can easily be moved from place to place, as the heaviest part only weighs about 250 lbs., the total weight being about 500 lbs.

Address S. K. SNODGRASS, DENVER, COLO. (The Windsor.)



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Mine Draining or Hydraulicking.

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BYRON JACKSON MACHINE WORKS, - SAN FRANCISCO, CAL.

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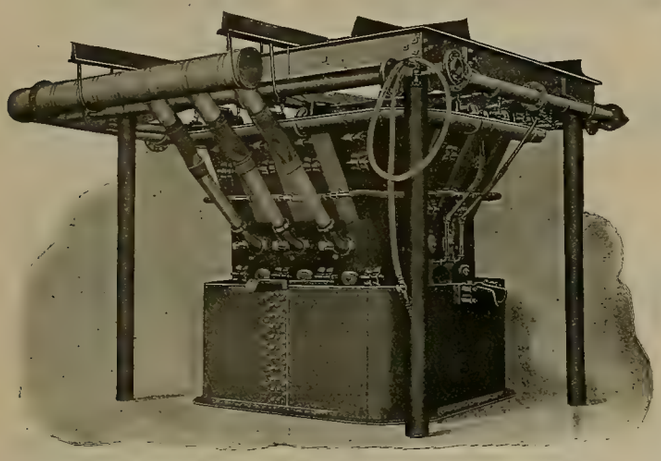

36 x 60 SILVER-LEAD FURNACE.

FOR THE TREATMENT OF

GOLD, SILVER, LEAD and COPPER ORES,

OF ANY DESIRED TONNAGE CAPACITY, PUT INTO SUCCESSFUL OPERATION UNDER GUARANTEE.

OUR **SPECIALTIES** ARE

Designing, Erecting and Fully Equipping all kinds of MILLS and SMELTERS.

Hundreds of plans of Mills and Smelters, previously built by us and now in successful operation, at the command of customers. Write us fully and we will send you proper catalogue and other information.

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ESTABLISHED 1860. DENVER, COLO., U. S. A.

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LEACHING TANKS,
SOLUTION "
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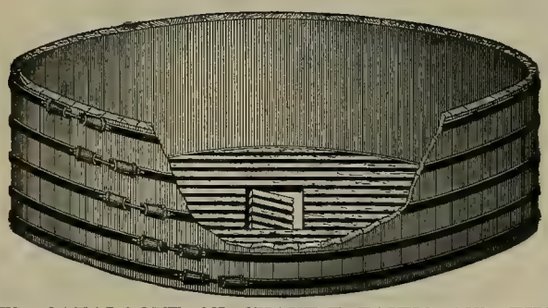
WATER "
EXTRACTION BOXES.



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SEND FOR ILLUSTRATED CATALOGUE OF CYANIDE TANKS AND FIXTURES, MAILED FREE.

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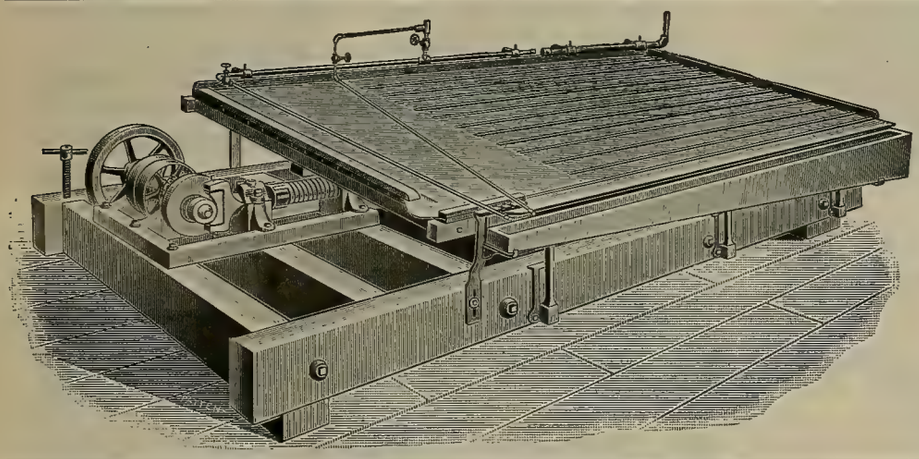

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THE Imperial Concentrating and Amalgamating Table is the latest invention of Mr. Geo. E. Woodbury, whose fame as one of the pioneer concentrator builders is world wide, machines of his manufacture being in general use in every country on the globe where the milling of ores is carried on. This Table is, however, built on entirely new lines, differing materially from either the well-known belt or bumping table types of concentrators.

SIMPLE IN ITS CONSTRUCTION. | SAVES FINE SULPHURETS.

WITHOUT LOSS IN TAILINGS.

MAKES HIGH PRODUCT. | CAPACITY FROM 5 TO 10 STAMPS.

GEORGE E. WOODBURY,

Send for Catalogue. 'Phone Main 1766. 223 First St., San Francisco, Cal.

ADAMANTINE SHOES AND DIES.

CHROME CAST STEEL.

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These castings are extensively used in all the mining States and Territories of North and South America. Guaranteed to prove better and cheaper than any others. Orders solicited subject to the above conditions. When ordering, send sketch with exact dimensions. Send for Illustrated Circular.

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MANUFACTURED BY The Western Chemical Co., DENVER, COLO.

For Laboratory Use and Fine Chemical Work.

PURITY GUARANTEED.

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It is now twenty years since we designed and began to build the GATES GYRATORY ROCK AND ORE BREAKER, since which time we have built nearly 5000 of these machines and set them at work in every quarter of the globe. The success attained by the introduction of this wonderful invention has been equaled by few triumphs in mechanical arts. We have constantly been improving the construction of the machine, and although in the lapse of time many of the original patents have expired, the Gates Breakers to-day are covered by more patents than ever before. We have continually been increasing the size of these machines until now we offer the public our size 9, weighing 150,000 lbs., having a capacity of **200 TONS PER HOUR**, and receiving masses of rock or ore weighing more than half a ton.

There are more than two hundred of these Breakers in the South African gold mines.

The Homestake Mining Co. of South Dakota, one of the largest mining properties on the North American Continent, paying a dividend every month, and having ore enough in sight to keep its 1000 Stamps busy for fifty years, uses

15 GATES ORE BREAKERS

and buys Gates justly celebrated Stamp Shoes in lots of 10,000.

We build every class of strictly modern

MINING MACHINERY.

For instance: The Trail Smelters and the Granby Consolidated Mining & Smelting Co.'s plant were supplied by us, and they are the model smelting plants of British Columbia. We guaranteed a capacity of 500 tons per day in the Granby Co.'s two furnaces, while they average 600 tons per day, and have handled as much as 736 tons of copper ore in twenty-four hours.

Gates Mining Machinery is always a little better than it is guaranteed to be.

We build the following Specialties besides those above mentioned: **Stamp Mills, High Grade Rolls, Dryers, Roasting Furnaces, Hoists, Elevators, Screens, Concentrators of every class**, and, in short, every improved mechanical device for working and reducing the precious ores. We built the first Stamp Mill ever set up in the Rocky Mountains. Our manufacturing history covers a period exceeding sixty years. We publish seventeen booklets fully describing our

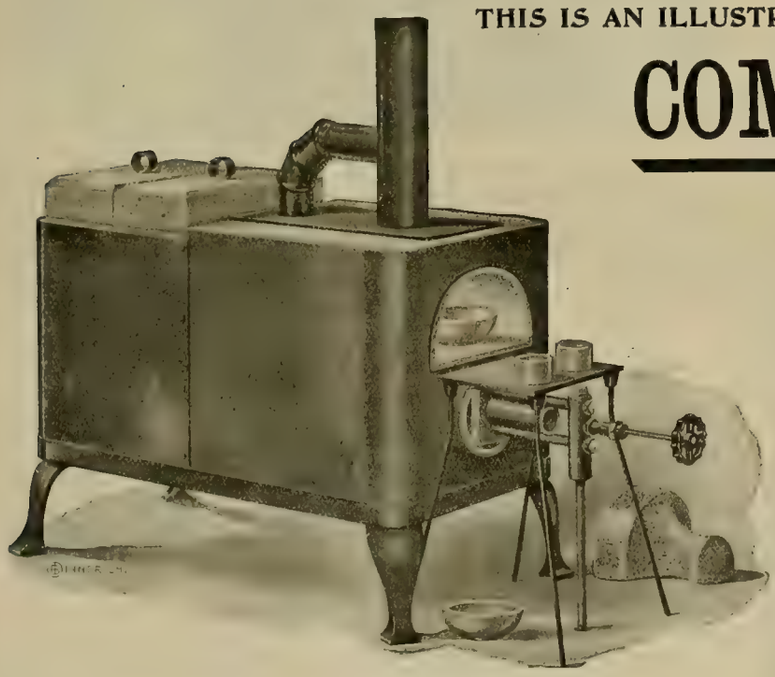
MINING MACHINERY, CEMENT MAKING MACHINERY, ROCK AND ORE CRUSHING PLANTS, Including Ballast and Macadam Plants.

In the issue of this paper of February 16th, we illustrated our

STANDARD BURNER.

THIS IS AN ILLUSTRATION OF OUR NEW

COMBINATION FURNACE,



PATENTED FEBRUARY 7, 1899.

which we make in two sizes.

Work in the crucible chamber of this furnace may be carried on without interfering in any way with operations in the muffle.

No Experiment ---- The result of experience. All inquiries answered fully. For sale by dealers everywhere.

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81 So. Clark Street, CHICAGO.

THE FULTON VARIABLE MOTION CONTINUOUS FLOW MINING PUMP.

Delivers a continuous stream with absolutely no water hammer so common with all other makes of pumps. Is particularly adapted to be driven by electric power, for the reason the resistance to motive power is almost uniform. I manufacture the FULTON PUMP in four sizes, ranging from 10 H. P. work to 50 H. P. work.

WRITE ME FULL PARTICULARS IN REGARD TO YOUR REQUIREMENTS.

The above cut is made from a photograph taken of a No. 3 FULTON PUMP at work on the 600 ft. level in the Tesla Mine at Tesla, Alameda Co., Cal.

Read what MR. O. NEWHOUSE, Consulting Engineer of the S. F. & S. J. Coal Co., has to say in egard to it.

OFFICE S. F. & S. J. COAL CO., TESLA, ALAMEDA CO., CAL., July 18, 1900.

Mr. A. T. Ames, Galt, Cal.—DEAR SIR: Replying to your favor of recent date, regarding the working of the Fulton Pump bought of you, will say: The pump is one of your No. 3 pumps, working in connection with a Fulton Double X, double plunger cylinder 5 in. diameter by 110 in. long; stroke of each plunger 2 ft. This pump is installed in our mine on the 600 ft. level, directly over our sump, and is forcing the water to the surface at one lift. We drive the pump with an electric motor, 30 H. P., direct connected to the pump with gear and pinion, and I am pleased to submit the following statement of duty:

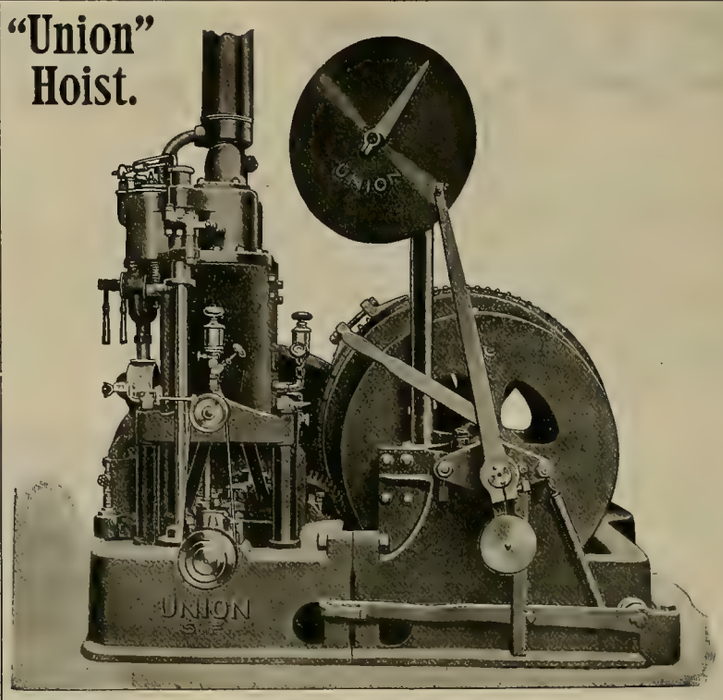
Length of 6 in. column leading up incline to surface	805 ft.	Strokes double per minute	25
Perpendicular head	640.88	Discharge, measured by box center thereof, under 5 in. head, equal to 1¼ cu. ft., equal to gallons per hour	4725
Gauge pressure, actual	275 lbs.	Diameter of pump cylinder	5 in.
" " theoretical	278.14 "	Net area of pump cylinder after deducting area of piston	17.868 sq. in.
Barometer at pump	29 58 in.	Efficiency of pump when working under above conditions	84.80 per ct.
" point of discharge	28.95 "		
Temperature air	58 deg.		
" water	76 "		

To say that we are highly pleased with our pump expresses it very mildly.

Signed, O. NEWHOUSE, Consulting Engineer S. F. & S. J. Coal Co.

Manufactured and Sold by A. T. AMES, Galt, Cal.

"Union" Hoist.



The above illustrates the 25 H. P. double cylinder, single drum "Union" hoist, with all the latest improvements.

THE UNION GAS ENGINE CO.

—BUILD THE—

"Union" Gas Engines,

Which use either MANUFACTURED or NATURAL GAS, ORDINARY STOVE GASOLINE (NAPHTHA or BENZINE), DISTILLATE or KEROSENE.

STATIONARY ENGINES for All Kinds of Work in Sizes from 3 to 300 h. p. in actual use.
"UNION" COMBINED HOISTS in Sizes from 2 to 130 h. p. in actual use.
"UNION" COMBINED COMPRESSORS—20, 30, 40 h. p.
HOISTS and COMPRESSORS Can Be Built in Larger Sizes to Order.
"UNION" MARINE ENGINES, 4 to 200 h. p., of Single, Double and Four-Cylinder Types.
FIFTEEN YEARS' EXPERIENCE Building Gas and Oil Engines.
"UNION" ENGINES Are In Use All Over the United States.
"UNION" ENGINES Are Simple, Durable and Economical.

Office, 248 First Street. Works, Corner First and Clementina Streets. SAN FRANCISCO, CAL.

Globe Battery Stem Guide.

PATENTED AUGUST 24, 1897.

RIGID, SIMPLE, DURABLE, EFFICIENT, ECONOMICAL.

No trouble to install. No keys or wedges to adjust. No alteration of mill necessary. Effect a saving in friction losses. Each stem can be removed independent of the others. Costs no more than wooden guides.

MANUFACTURED ONLY BY

GLOBE IRON WORKS, Stockton, Cal.

We Build the Truax Automatic Ore Cars.

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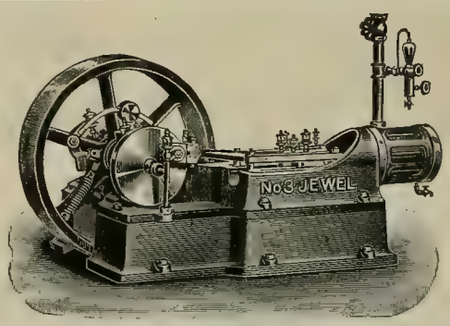

A THOROUGHLY RELIABLE, SIMPLE, HIGH CLASS, PERFECTLY GOVERNED AUTOMATIC ENGINE AT A REASONABLE PRICE.

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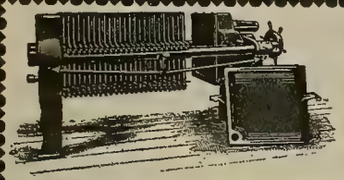
SAN FRANCISCO, SACRAMENTO, LOS ANGELES.



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CYANIDE
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And Other Aquarious Chemical Solutions.

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Removes all Slimes and Hastens the Deposition of the Metals.

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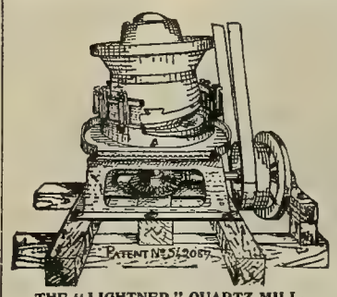

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W. H. Birch & Co.

No. 127 to 135 First St., San Francisco, Cal.

—BUILDERS OF—

LIGHTNER QUARTZ MILLS.

No. 1	works	3	tons per day	with	1½	H. P.
No. 2	"	4 to 7	" "	"	2½	"
No. 3	"	10 to 15	" "	"	3½	"

LARGER MILLS BUILT. SEND FOR CIRCULAR.

"Birch" Two-Stamp Mills, McGlew Concentrators, And All Kinds of Mining Machinery.

NONPARIEL ANTI-FRICTION METAL.

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BEST ANTI-FRICTION METAL FOR ALL MACHINERY BEARINGS. FOR HIGH SPEED AND HEAVY CRUSHING WEIGHT IT HAS NO EQUAL.

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ELECTRIC MACHINERY FOR ALL PURPOSES.

ELECTRIC COMBINATION LOCOMOTIVES, USING COG-RAIL ON STEEP GRADES AND TRACTION ON LEVEL ROADS.

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Nine Thousand Wheels Now Running,

Averaging some 700,000 H. P.

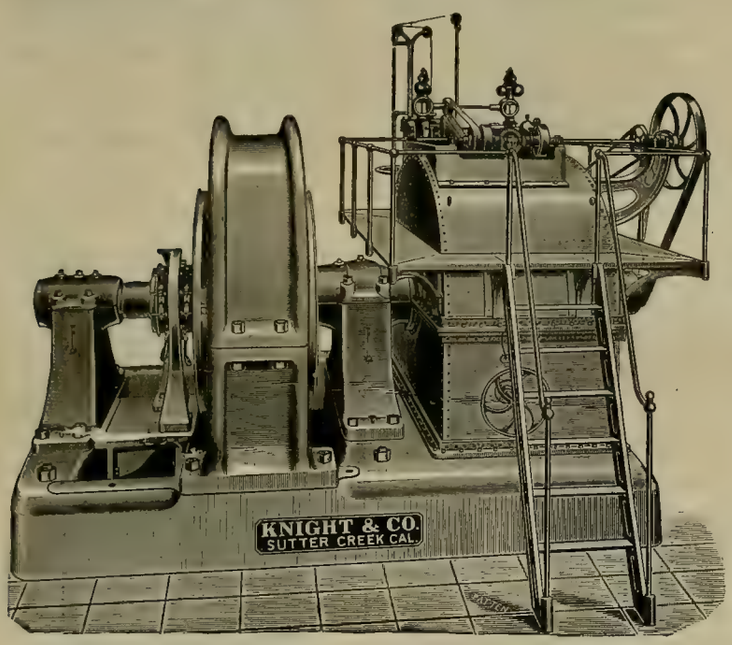
ELECTRIC POWER TRANSMISSION.

Pelton wheels afford the most reliable and efficient power for such service and are running the majority of stations of this character in the United States, as well as most foreign countries. Highest efficiency and absolute regulation guaranteed under the most extreme variations of load.

The Pelton Water Wheel Company,

121 & 123 MAIN STREET, SAN FRANCISCO, CAL.

KNIGHT'S WATER WHEEL.



The accompanying cut shows the general arrangement of **The Knight Water Wheel**, direc-coupled to a 750 kilowatt generator, with governor mounted on top of wheel casing.
These wheels are designed for **100 to 2500 H. P. Highest efficiency and regulation guaranteed.**
WHEELS FROM 6 TO 24 INCHES, ENCLOSED IN CAST-IRON CASING.
Wheels for mill and reversible hoisting works a specialty.

KNIGHT & CO., Sutter Creek, Cal.

For full particulars, send for descriptive catalogue.

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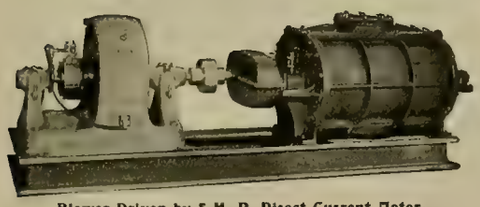

Blower Driven by 5 H. P. Direct Current Motor.

Exhaust Fans

may be run with less attention than any other motive power.

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No. 1 Single Circular. 8,000-10,000 ft. per day.

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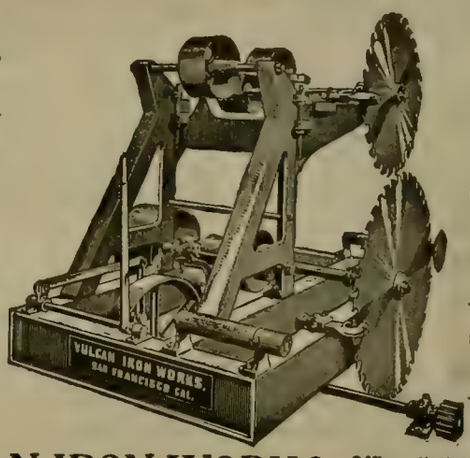

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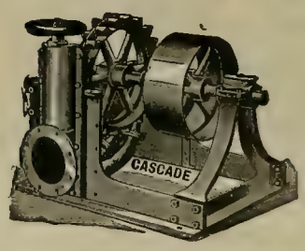
TURBINE AND CASCADE WATER WHEEL



Adapted to all Heads from

3 Feet to 2000 Feet.

Our experience of 38 YEARS building Water Wheels enables us to suit every requirement of Water Power Plants. We guarantee satisfaction.

State your Head and requirements. Send for pamphlet.

JAMES LEFFEL & CO.
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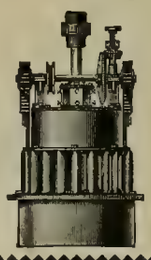
THE McCORMICK TURBINE.



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Manufactured by D. HUG,
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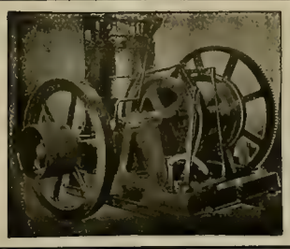

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Will raise more ore than any other **AT LESS COST.**

MANY IN USE, Giving Satisfaction.

Built for any Capacity and for any Purpose.
Pumping Water, Propelling Boats, Hoisting Ore, Machine Shop Power, Etc.

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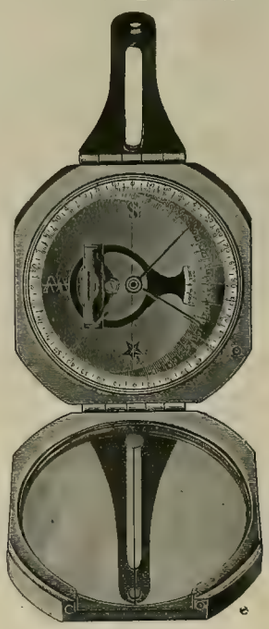

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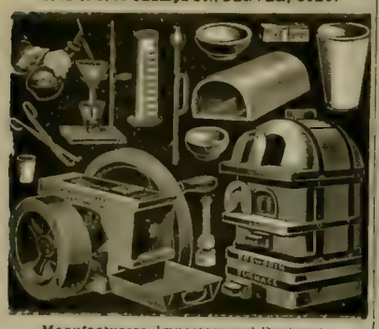

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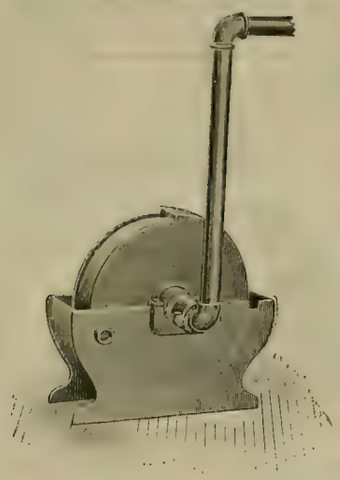

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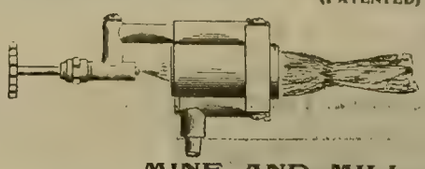

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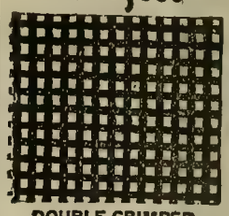

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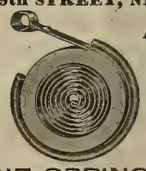

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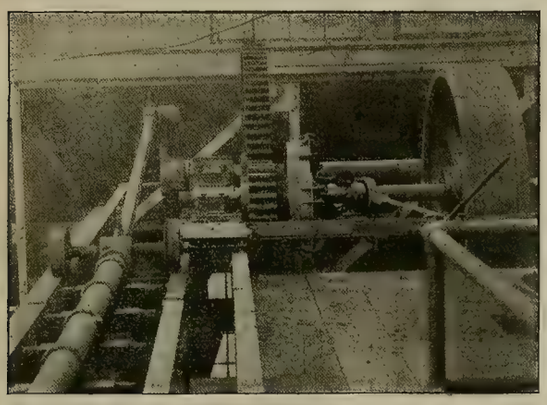

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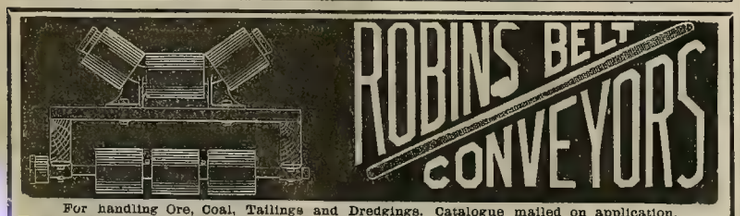

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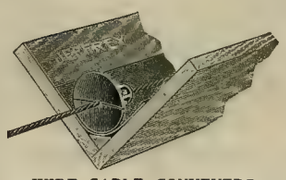

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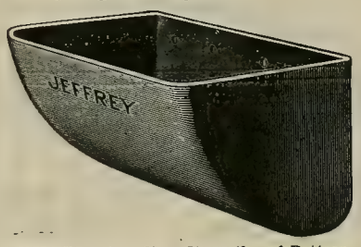

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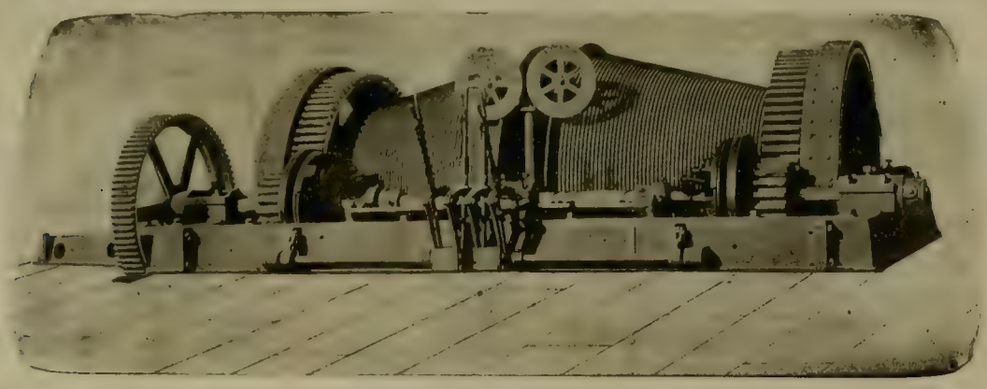

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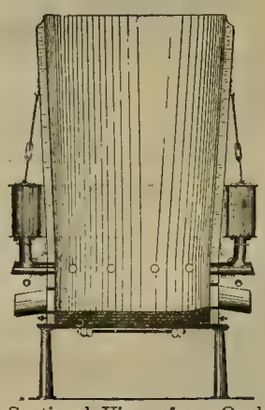

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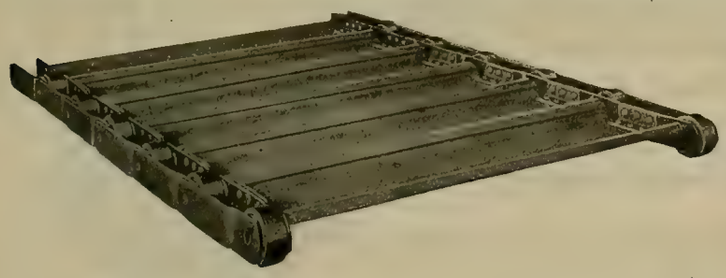

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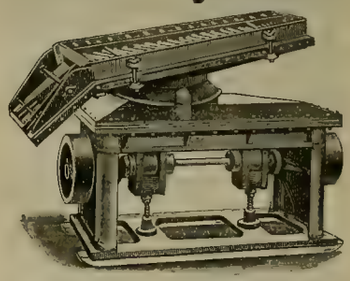

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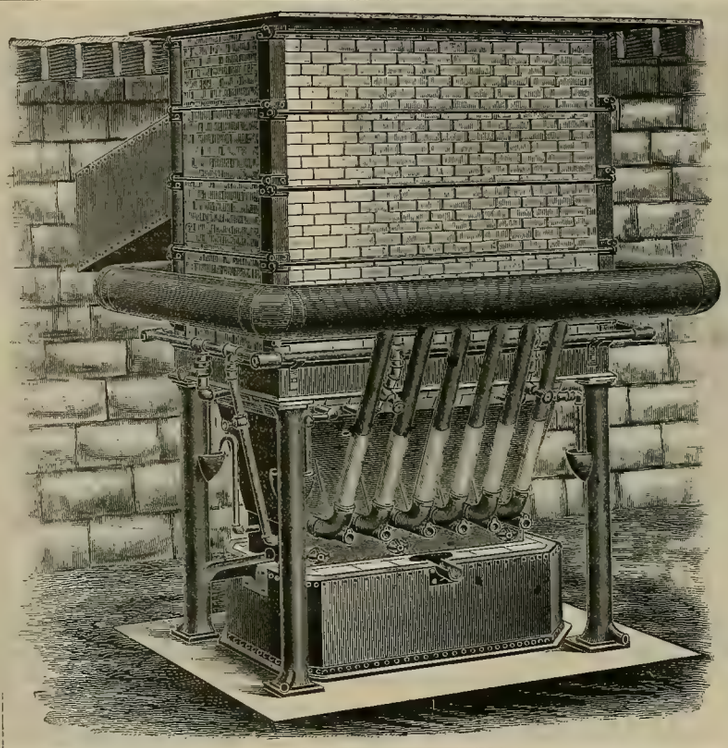

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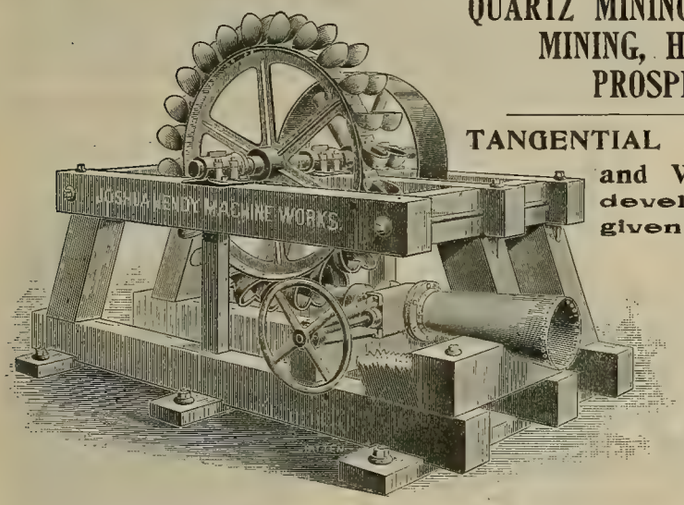

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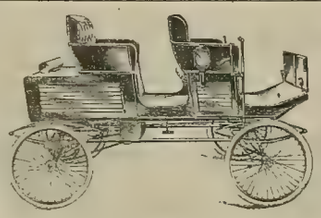

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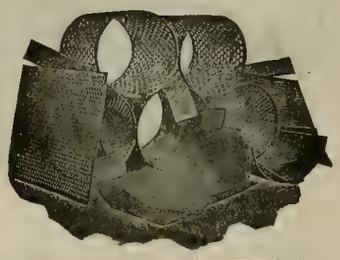

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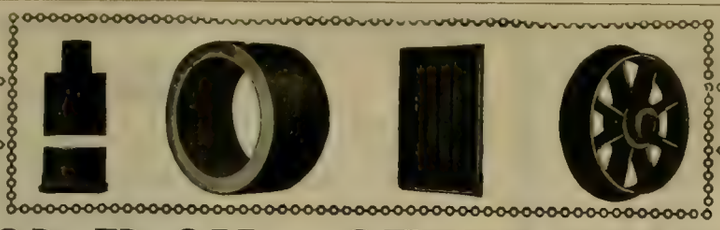

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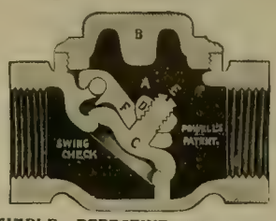

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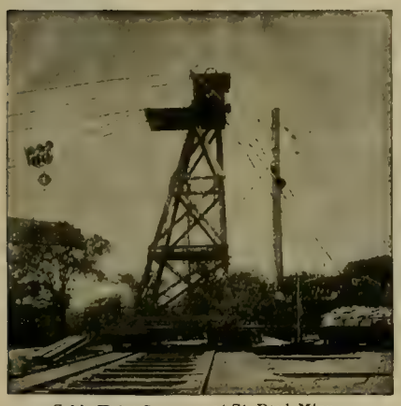

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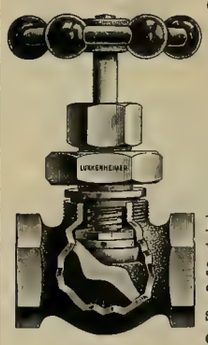

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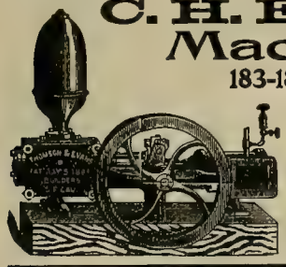

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ASSESSMENT NOTICES.

ALLIANCE EXPLORATION & MINING COMPANY.—Location of principal place of business, San Francisco, California; location of works, Ophir, Placer County, California.

Notice is hereby given, that at a meeting of the Board of Directors, held on the 12th day of February, 1901, an assessment (No. 3) of two (2) cents cents per share was levied upon the capital stock of the corporation, payable immediately in United States gold coin, to the secretary, at the office of the company, 236 Sutter street, San Francisco, California.

Any stock upon which this assessment shall remain unpaid on the 18th day of March, 1901, will be delinquent, and advertised for sale at public auction; and unless payment is made before, will be sold on MONDAY, the 8th day of April, 1901, to pay the delinquent assessment, together with the costs of advertising and expenses of sale.

By order of the Board of Directors.

S. GOLDSMITH, Secretary.

Office—236 Sutter street, San Francisco, California.

MARIPOSA COMMERCIAL AND MINING COMPANY.—Location of principal place of business, San Francisco, California; location of works, Mariposa County, California.

Notice is hereby given, that at a meeting of the Board of Directors, held on the 23d day of February, 1901, an assessment (No. 21) of Ten ($10) Dollars per share was levied upon the capital stock of the corporation, payable immediately in United States gold coin, to the secretary, at the office of the company, 320 Sansome street, room 24, San Francisco, California.

Any stock upon which this assessment shall remain unpaid on the 11th day of April, 1901, will be delinquent, and advertised for sale at public auction; and unless payment is made before, will be sold on SATURDAY, the 4th day of May, 1901, to pay the delinquent assessment, together with the costs of advertising and expenses of sale.

By order of the Board of Directors.

JOSEPH H. MOOSER, Secretary.

Office—320 Sansome street, room 24, San Francisco, California

SPANISH CONS. QUARTZ MINING COMPANY.—Location of principal place of business, San Francisco, California; location of works, Nevada County, California.

Notice is hereby given, that at a meeting of the Board of Directors, held on the 12th day of February, 1901, an assessment (No. 4) of five (5) cents per share was levied upon the capital stock of the corporation, payable immediately in United States gold coin, to the secretary, at the office of the company, 113 Crocker Building, San Francisco, California.

Any stock upon which this assessment shall remain unpaid on the 19th day of March, 1901, will be delinquent, and advertised for sale at public auction; and unless payment is made before, will be sold on MONDAY, the 8th day of April, 1901, to pay the delinquent assessment, together with costs of advertising and expenses of sale.

By order of the Board of Directors.

B. N. SHOECRAFT, Secretary.

Office—113 Crocker Building, San Francisco, California.

DELINQUENT SALE NOTICE.

YUBA RIVER GOLD DREDGING COMPANY.—Location of principal place of business, San Francisco, California; location of works, Smartsville, Yuba County, California.

Notice.—There are delinquent upon the following described stock, on account of assessment (No. 2) levied on the 4th day of January, 1901, the several amounts set opposite the names of the respective shareholders, as follows:

Names.	No. Cert.	No. Shares.	Amt.
Henry Hilp	4	5	$0 15
Albert Moch	8	2,000	60 00
A. W. Goldsmith	9	2,000	60 00
H. L. Frank	14	1,000	30 00
H. L. Frank	15	1,000	30 00
H. L. Frank	16	1 000	30 00
H. L. Frank	17	1 000	30 00
H. L. Frank	18	1,000	30 00
H L Frank	19	1,000	30 00
H. L. Frank	20	1,000	30 00
H L. Frank	21	1,000	30 00
H L Frank	22	1 000	30 00
Henry Hilp	28	500	15 00
M. E. Mayer	32	500	15 00
Hannah Heringhi, Trustee	33	300	9 00
S. Belasco, Trustee	34	200	6 00
Ed. Belasco, Trustee	35	200	6 00
Sarah Mayer, Trustee	36	200	6 00
I. Belasco	37	250	7 50
S. Belasco	38	100	3 00
Rose Haas	39	200	6 00
E Heringhi, Trustee	40	200	6 00
Mark Thall	41	200	6 00
Louis Heringhi	48	100	3 00
Martin Freund	49	500	15 00
G. A Kornberg	66	10,000	300 00
G. A. Kornberg	67	10,000	300 00
G. A. Kornberg	68	10,000	300 00
G. A. Kornberg	72	1,000	30 00
G. A. Kornberg	73	1,000	30 00

And in accordance with law, and an order from the Board of Directors, made on the 4th day of January, 1901, so many shares of each parcel of such stock as may be necessary, will be sold at public auction at the office of the company, Room 31, No. 214 Pine street, San Francisco, California, on TUESDAY, the 5th day of March 1901, at the hour of 2 o'clock P M. of said day, to pay said delinquent assessment thereon, together with costs of advertising and expenses of sale.

ALBERT CERF, Secretary.

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AMERICAN OIL AND REFINERY COMPANY.—Location of principal place of business, San Francisco, California. Location of works, Contra Costa County, California.

Notice.—There are delinquent upon the following described stock, on account of assessment (No. 2) levied on the 26th day of November, 1900, the several amounts set opposite the names of the respective shareholders, as follows:

Names.	No. Cert.	No. Shares.	Amt.
Abbott, William	720	50	$2 50
Abbott, William	721	50	2 50
Abbott, William	722	50	2 50
Abbott, William	723	25	1 25
Abbott, William	734	25	1 25
Anthony, J. C., Trustee	797	1,000	50 00
Anthony, J. C., Trustee	798	1,000	50 00
Anthony, J. C., Trustee	799	1,000	50 00
Anthony, J. C., Trustee	973	1,000	50 00
Anthony, J. C., Trustee	1021	4 300	215 00
Dignan, J. P	1039	1,000	50 00
French, Mrs. Mary L	385	2	10
Goodenough, S	1046	380	19 00
Holbrook, W. E., Trustee	897	10.000	500 00
Holbrook, W. E., Trustee	898	11,000	550 00
Holbrook, W. E., Trustee	899	4,500	225 00
Holbrook, W. E., Trustee	900	4,500	225 00
Kielhofer, Mrs. Louis	298	2	10
Kraehmer, Louis L	471	3	15
Laird, Mrs. L. N	230	5	25
Lord, Mrs. Leona E	327	2.000	100 00
Lucas, Mrs T. R	848	10	50
Mayer, Mrs. L	406	800	40 00
Masey, James B	914	1	05
McKelvey, Mrs Angelina	71	12	60
McAllister, H. L	1071	100	5 00
Pope, Wm	656	50	2 50
Pope, Wm	695	20	1 00
Pope, Wm	764	30	1 50
Pope, Wm	908	20	1 00
Raht, Julia F	321	25	1 25
Raht, Julia F	453	40	2 00
Rachel, Mrs. Eliza	856	400	20 00
Royce, Lizzie A	441	5	25
Russell, G. E	125	3	15
Stover, W. M	1047	480	24 00
Truitt, J. J	399	5	25
Walser, Mark	858	1,000	50 00
Walser, Mark	859	1,000	50 00
Walser, Mark	860	1,000	50 00
Walser, Mark	861	1,000	50 00
Walser, Mark	863	500	25 00
Walser, Mark	867	500	25 00
Walser, Mark	868	500	25 00
Walser, Mark	869	500	25 00
Walser, Mark	870	500	25 00
Walser, Mark	871	500	25 00
Walser, Mark	872	500	25 00
Walser, Mark	921	50	2 50
Walser, Mark	926	5,000	250 00
Walser, Mark	927	5,000	250 00
Walser, Mark, Trustee	596	500	25 00
Walker, Mrs. S. E. D. E	375	120	6 00
Young, R	761	328	16 40

And in accordance with law, and an order from the Board of Directors, made on the 26th day of November, 1900, so many shares of each parcel of such stock as may be necessary, will be sold at public auction at the office of said corporation, in Rooms 322-323 Parrott building, San Francisco, California, on MONDAY, the 28th day of January, 1901, at the hour of 1 o'clock P. M. of said day, to pay said delinquent assessment thereon, together with costs of advertising and expenses of sale.

J. C. ANTHONY, Secretary.

Office—Rooms 322-323, Parrott building, San Francisco, California.

POSTPONEMENT.

By order of the Board of Directors, the day of sale of the above delinquent stock has been postponed to MONDAY, the 11th day of February, 1901, at the hour of 1 o'clock P. M., at the office of said corporation in Rooms 322-323 Parrott building, San Francisco, California. J. C. ANTHONY, Secretary.

POSTPONEMENT.

By order of the Board of Directors, the day of sale of the above delinquent stock has been postponed to MONDAY, the 25th day of February, 1901, at the hour of 1 o'clock P. M., at the office of said corporation in Rooms 322-323 Parrott building, San Francisco, California. J. C. ANTHONY, Secretary.

POSTPONEMENT.

By order of the Board of Directors, the day of sale of the above delinquent stock has been postponed to MONDAY, the 11th day of March, 1901, at the hour of 1 o'clock P. M., at the office of said corporation in Rooms 322-323 Parrott building, San Francisco, California J. C. ANTHONY, Secretary.

DELINQUENT SALE NOTICE.

TANANA MINING COMPANY.—Location of principal place of business, San Francisco, California.

Notice.—There are delinquent upon the following described stock, on account of assessment (No. 2) levied on the 20th day of December, 1900, the several amounts set opposite the names of the respective shareholders, as follows:

	No. cert.	No. shares.	Amt.
Arthur H. Ten Broeck	10	250	25 00
W. C. Price	15	250	25 00

And in accordance with law, and an order from the Board of Directors, made on the 20th day of December, 1900, so many shares of each parcel of such stock as may be necessary will be sold at public auction at the office of the secretary, Edward H. Stearns, at Room 801, Claus Spreckels Building, at the corner of Third and Market streets, San Francisco, California, on WEDNESDAY, the 6th day of March, 1901, at the hour of 12 o'clock M. of said day, to pay said delinquent assessment thereon, together with costs of advertising and expenses of sale.

EDWARD H. STEARNS, Secretary.

Office—Room 801, Claus Spreckels Building, Cor. Third and Market Sts., San Francisco, California.

ANNUAL MEETING.

The Regular Annual Meeting of the Stockholders of the SPANISH CONS. QUARTZ MINING COMPANY will be held at the office of the Company, 113 114 Crocker Building, San Francisco, California, on WEDNESDAY, the 13th day of March, 1901, at the hour of 2 o'clock P. M., for the purpose of electing a Board of Directors to serve for the ensuing year, and the transaction of such other business as may come before the Meeting.

Transfer Books will close on SATURDAY, March 2, 1901, at 12 o'clock noon.

B. N. SHOECRAFT, Secretary.

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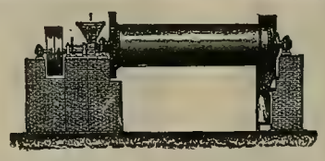

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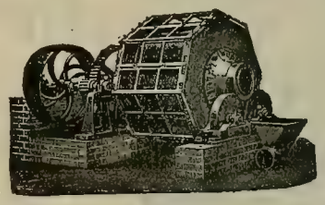

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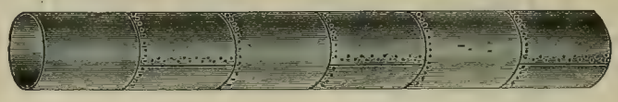

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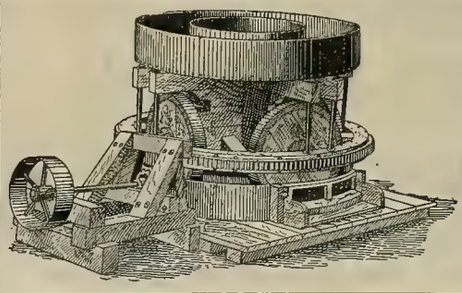

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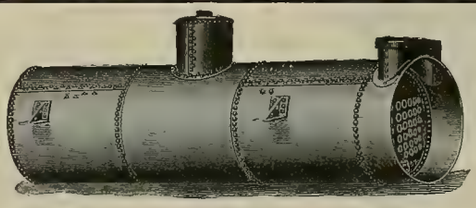

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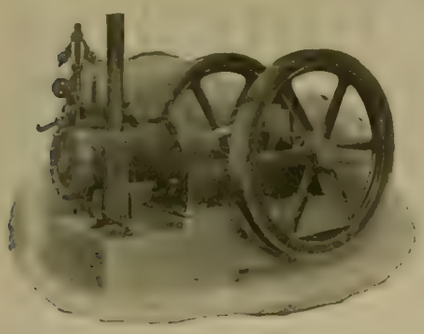

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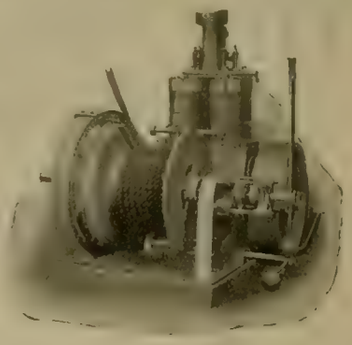

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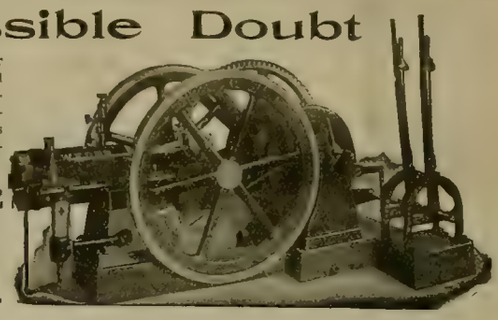

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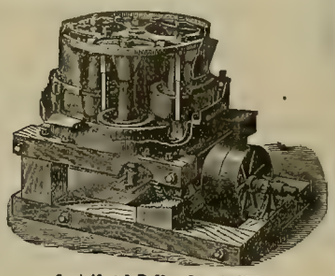

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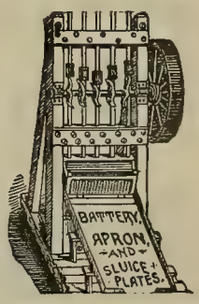

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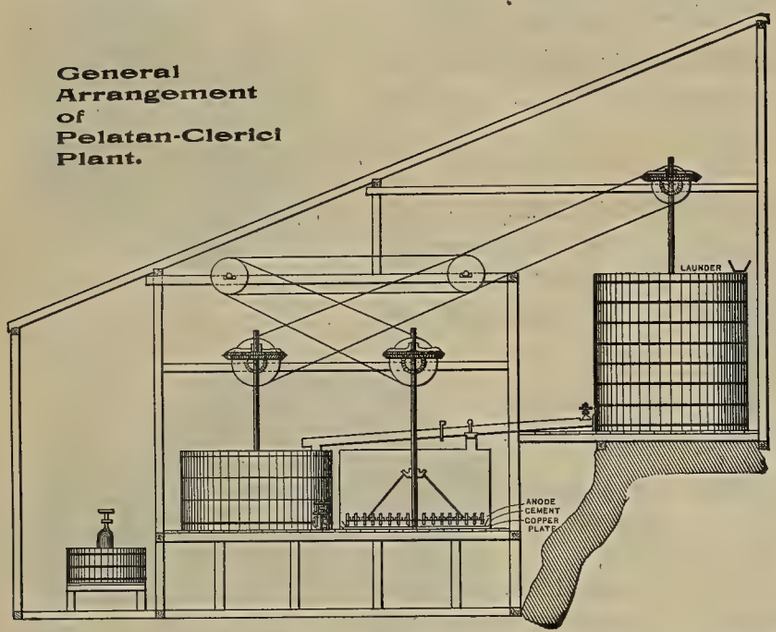

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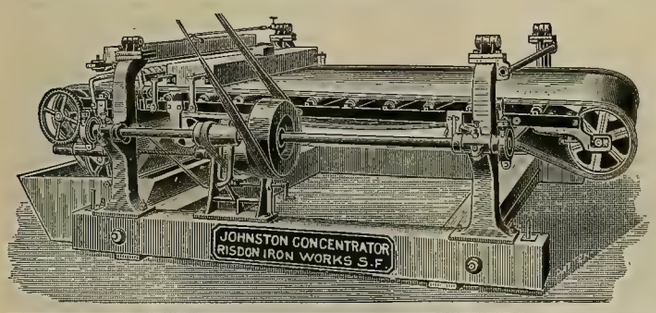

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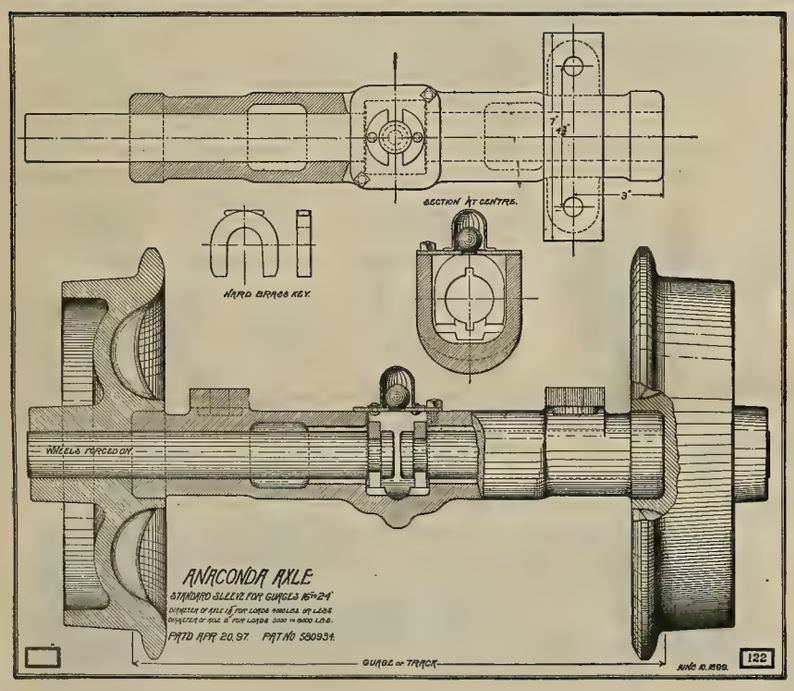

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Whole No. 2120.—VOLUME LXXXII. Number 10. SAN FRANCISCO, SATURDAY, MARCH 9, 1901. THREE DOLLARS PER ANNUM. Single Copies, Ten Cents.

The Latest in Metallurgy.

So many apparently chimerical theories have been ultimately made practical and profitable that men hesitate to pronounce any proposition impossible, though, often, in mining and metallurgy, "processes" and propositions are put forward with extravagant claims that fall before practical test. The latest in metallurgy is the claim made by Dr. Miller of Mt. Pleasant, Pa., whose idea is that he will "revolutionize" smelting. Everything else in the mining and metallurgical world has been about to be "revolutionized" several times, and now it is the turn of the smelter.

As usual, the discovery was "accidental," and the whole matter is one of profound secrecy. Accident and secrecy are always the necessary accompaniments of all those things. The gist of this latest secret revolution is that the learned doctor takes or makes a composition which he dignifies by the name of "flux," and upon mixing this flux with asbestos, and "placing it in a crucible with raw ores the heat produced is so intense that the asbestos becomes liquefied." The alleged action of this liquefaction results in immediate separation of the metal from the ore; and without crushing or other preparation, "in forty minutes the removal of the dross from the top of the crucible shows the pure copper, lead, silver or gold beneath." This is better than anything the famous Emmens or the infamous Hartzfeldt ever claimed, though in the case of the Pennsylvania doctor he appears to have made the assertion so many times that he is beginning to believe it himself.

It further appears that experiments at the steel mills of the Fox Copper & Bronze Co., and MacIntosh, Hemphill & Co., Pittsburg, Pa., showed that the flux and the "liquid asbestos" together "removes over 98% of the metal from the crude ore without any prior crushing; this has never been possible before in the history of mining." The truth of the last eleven words in the preceding quotation can not be denied.

Not only does this combination obligingly free the metal from the ore without any annoying labor as at present is necessary, but where the ore contains two or more metals, they arrange themselves in separate layers, so that the process is complete; further information is also vouchsafed to the effect that these "separate layers" of gold, silver, copper, etc., are each "absolutely pure," thus dispensing with the present methods of parting, or production of pure gold or silver, etc.

One would think that all this is enough, but the venerable doctor also assures us that this "flux," which, in connection with the "liquid asbestos," does all these clever things, is indestructible. That is, certainly, in accordance with the eternal fitness of things; if it isn't, it ought to be. The inventor or discoverer or creator thereof asserts that "it can be used over and over again," never mixing with the metals, never sullying their virgin purity, but going on and on in an eternity of perpetual combustion, for does not the doctor himself assure us that "asbestos once lighted successfully will never cease burning." The Pennsylvania chemist makes final statement that the "formula is very cheap, and will not interfere with the commercial value in the least."

The next thing, probably, will be the formation of a company and the proffer of stock. People who believe in wave motors, extraction of gold from sea water, divining rods, etc., will thus have an opportunity of being parted from their money.

Lead City, South Dakota, the Mining Center of the Black Hills.

Black Hills, South Dakota.

When one speaks of the Black Hills, the Homestake mine is always first in mind. The mine, mill, works and methods have been technically described herein, and it is here referred to as a solid exponent of the mineral wealth of that region. It has employed from 1000 to 2000 men for the last twenty years, has now about 2200 men on its payroll, has paid about $9,000,000 in dividends and has in the past eighteen months inaugurated substantial improvements that betoken the permanent character of the mine. Nearly $1,000,000 has been expended in securing adequate water supply; $250,000 has been put into a new hoisting plant; $200,000 has been spent on a cyanide plant having a daily capacity of 1200 tons, and the company now contemplate the erection of another on the north side of Lead hill to treat the tailings. The illustrations give a good idea of the appearance of the Homestake M. Co.'s mills at Lead City, and of the city itself, a bustling mining center of 8000 population, on the B. & M. Railroad, "the Burlington Route." In that vicinity chlorination has also proved profitable, saving about 92% of the gold, but none of the silver, the cyanide process saving from 80% to 92% of the gold and 63% of the silver.

Homestake Mills, Lead City, South Dakota.

MINING AND SCIENTIFIC PRESS.

ESTABLISHED 1860.

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W. D. CURTIS.....223 W. Second St., Los Angeles, Cal.

San Francisco, March 9, 1901.

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A New Heat Producer.

Considerable space has been devoted herein to notice of the production of a high temperature by the use of aluminum, which is now proving of such commercial importance to electricians and others. The reducing power of aluminum—that is, its ability to extract oxygen from other substances—is now being utilized in a variety of industrial processes, permitting a degree of heat heretofore commercially obtainable only by the use of an electric furnace. Dr. Goldschmit of Essen, Germany, has continued the experiments previously noted and has confirmed the claims formerly advanced regarding the commercial utility of the process.

In the present state of the art there is an aluminum furnace the insulated walls of which are lined with the most refractory substance obtainable. Into this furnace is introduced ground aluminum, well mixed with iron oxide, to which is added a small quantity of barium peroxide, the latter to start the oxidation of the aluminum at a low temperature, and ignited by a ribbon of magnesium, the magnesium being set on fire with a match, flung into the furnace, when the mixture at once ignites, soon resolving itself into a liquid mass of two layers, the lower molten iron, the upper a scum of aluminum oxide. This upper scum may be poured off, the temperature of the molten iron underneath being of a degree that causes it to act upon steel plates and bars about as boiling water would on ice. The first practical use to which it has been applied is in welding steel rails. Additional use is suggested in the local softening of armor plate for drilling holes therein, welding steam pipes, casting new pieces in broken cylinders, replacing broken teeth in cog wheels, welding any large broken parts of heavy machinery, and repairing broken screw shafts at sea.

No heavy or complicated mechanism is necessary. In remote localities it can be made work on a small scale as satisfactorily as elsewhere, a small box of powder and a match affording anywhere and everywhere means of producing heat of a degree hitherto unobtainable except by the use of costly and complicated devices.

A GOOD example of mining and scientific progress is afforded in the Black Hills country, South Dakota. The history of that region is a succinct account of scientific mining progress and evolution from the first effort to complete commercial success. As at Mercur, Utah, the Witwatersrand, South Africa, El Oro, Mexico, and parts of Australia, the gold ore was at last found to be amenable to the cyanide process, and in a comparatively small area twelve cyanide plants are now in successful operation.

U. S. Public Lands.

Everything in connection with the administration and disposition of the public lands of the United States, and of the public domain until it has passed from under the jurisdiction of the U. S. Government, is under the direction and control of the Interior Department, in which, among other bureaus, is the General Land Office, and to which latter division is delegated direct supervision and care. There yet remain in the United States, exclusive of its island ownerships, about 1,000,000,000 acres, which is being disposed of at the rate of about 10,000,000 acres annually. A great portion of this area is still unsurveyed; the sketch on page 125 illustrates in a portion of this west half of America the proportion of surveyed to unsurveyed land. In general, of the 1,000,000,000 acres of public domain there is about half of that area unsurveyed. Of that half there are about 300,000,000 acres of "desert" or "arid" land to be dealt with by irrigation. Of these 300,000,000 acres about 70,000,000 are declared to be barren and irreclaimable. Discussion of how the remaining 230,000,000 acres shall be reclaimed has resulted in some practical effort, which, so far as the States most interested are concerned, has now come to be a question of who shall do the work, the States or the General Government. Water and forest societies have been working on it in different States and material progress has been made. The question affects the several Western States and Territories to a considerable degree.

There are in California about 17,000,000 acres susceptible of irrigation and reclamation; in Colorado, 8,000,000; in Arizona and Nevada, 2,000,000 each; in Oregon and Washington, 3,000,000 each; in Utah and New Mexico, 4,000,000 each; in Idaho, 7,000,000; in Wyoming, 9,000,000, and in Montana, 11,000,000—a total of 70,000,000 acres. The matter has been before the Legislatures of the several States and Territories and before Congress; its magnitude and extent necessarily make progress slow, but some advance is being made. About one-sixth of the vacant public domain is forest land and of this proportion there have been 47,000,000 acres embraced in thirty-eight forest reserves and there is now pending national legislation which contemplates further absorption of 54,000,000 acres for the same purpose, which, when completed, will place under permanent national control over 100,000,000 acres of forest reserves. The greater proportion of the remaining area may be considered under the general title of mineral land. This simple statement illustrates the vast extent and value thereof, and the immense possibilities in its development and use.

The manner of obtaining public land differs according to the kind and its location. In some of the older settled States all public lands are disposable under private cash entry, though also subject to the homestead law; but this rule does not apply west of the one hundredth meridian. There are some few isolated tracts subject to homestead entry for three years after the surrounding lands have been disposed of, and which can be bought upon filing an affidavit that the lands are not mineral, stone nor timber lands, when, after a public notice and public offer of sale, a tract not exceeding 160 acres can be bought by any one individual bidder. Lands valuable for timber and stone alone can be bought for $2.50 an acre in individual tracts not exceeding in any case 160 acres. The applicant must make affidavit that the land is unfit for cultivation, is bought for his own use and benefit, that there is no bargain to sell it, and that it is non-mineral. Saline lands are purchasable on accepted proof of their being as represented, the manner of sale being at public auction to the highest bidder for not less than $1.25 an acre. This law does not apply to the Territories. In the Pacific Coast States if such lands are not sold in the manner designated they can be bought afterward at private cash entry for $1.25 an acre. Coal lands, while still a part of the public domain, can be bought at a minimum price of $10 an acre, if over 15 miles from a completed railroad in operation, and $20 an acre when at a less distance therefrom, 160 acres being the limit procurable by one person, or 320 acres to an association of any number of persons, with the exception that where four or more persons have proved the expenditure by them of at least $5000 in work and improvement of the coal land they may then enter 640 acres of such coal land.

Additional homestead entries are allowed to soldiers of the United States who served in the civil war of 1861-65 and who made entry of less than 160 acres of land before June 30, 1874, they being allowed to take up such additional amount of land as would complete the 160 acres originally allowable in their case. The Act of Congress of June 4, 1897, allows what is known as a forest reserve lieu land right, which permits holders of lands in forest reserves to relinquish those lands to the Government and to select equal quantities of surveyed non-mineral public land in lieu thereof. Private entries of public lands are also permissible by what is known as scrip, which is receivable for non-mineral land. That scrip has been about all bought up and used, some of it in a manner not contemplated by the Government, as in the case of California oil lands. This matter possesses considerable present interest by reason of the great activity in the California oil development, and a full exposition of the entire subject relating to scrip and title of oil lands in California appeared in the issues of April 7, 14 and 21, 1900, in the shape of a special expert article on that subject, going into the entire matter in detail and giving full particulars of the scrip, its use, and the law bearing thereon.

A very large portion of the public land that was not granted to railroad companies was taken up under what is called the homestead act, which permits 160 acres or less of non-mineral public land, surveyed or unsurveyed, to be acquired by qualified persons, the only requirements being that they cultivate and improve the land for a continuous period of five years. This, and absorption by the part of the law which permitted similar acquirement of public domain by commutation, etc., has so exhausted resource in that direction as not to require much further reference. It may be observed, however, that the full five years' residence is not required of any one who served for ninety days or more in the army or navy of the United States during the war of 1861-65, and credit to the limit of four years is allowed to such soldier or sailor in that war or the late Spanish war to apply to the five years' required residence. During 1900 there were about 8,500,000 acres acquired under homestead entries.

The desert land law is intended to aid in the reclamation of that part of the public domain concerning which it operates, and is assumed to apply solely to non-mineral and non-timbered land that without artificial irrigation is not susceptible of producing agricultural crops. This law applies to the Territories of Arizona and New Mexico and to the States of North and South Dakota, Wyoming, Utah, Montana, Idaho, Washington, Nevada, Oregon and California, and ordains that bona fide residents of those States and Territories can acquire land under the law, the maximum area to any individual being 320 acres, the price being $1.25 per acre. So much has been said regarding the remaining class of public area, namely, mineral lands herein, that nothing further need be added, the whole subject having been gone into in detail again and again, but the foregoing is deemed of sufficient present value to warrant appearance.

IT is being figured out in Clear Creek county, Colo., and elsewhere, that, taking all past and present attendant circumstances into consideration, the silver miner gets as much clear money out of the average grade ore—125 to 250 ounces per ton—at 61 cents per ounce in 1901, as he did at $1.22 per ounce in 1878. This hardly seems possible, but inspection of the compared prices in 1878 and 1901 indicates the correctness of the conclusion. Smelting charges, price of labor, cost of supplies and difficulties of transportation were among the causes that contributed in those old days to as diminished a net profit at $1.22 on silver production as is obtained now with silver at half that price.

THE magnitude of this winter's rainfall in California may be judged by the statement that at Sacramento, in the central part of the State, last week the Sacramento river was 28.2 feet above low water mark, and within 2 inches of the highest mark recorded in the last fifty years. In addition the heavy snows in the Sierras give warrant of abundance of water for all mining operations throughout the current year.

Concentrates.

THERE is no U. S. import duty on copper matte.

SO FAR as known, acetylene gas is not used in any mines west of the Missouri river.

TO FIND the horse power obtainable from one miners' inch, multiply the head of water in feet by .0024147.

A COMMERCIAL HORSE POWER requires—on an average—the consumption of five pounds of coal per hour.

SO FAR as known, there is no smelter west of the Missouri river in which nickel and antimony ores are treated.

RETORTING 150 pounds amalgam, 35% gold and 65% quicksilver, should yield in the redistillation from 85 to 90 pounds of the quicksilver.

SAN FRANCISCO uses about 400,000 incandescent lamps annually. The entire annual consumption of the United States is about 20,000,000.

THE annual production of tin is, approximately, 100,000 tons. Perak, in the Malay peninsula, is the largest tin-producing district in the world.

A HEAP of earth, the length of the slope being 45 feet from top to bottom, the slope being at an angle of 45°, has a vertical height of 31.8195 feet.

"HARD" WATER will take up but little lead from lead pipes; "soft" water, or carbonated water, will dissolve the lead in much greater quantity.

BOILERS operated at 5000 feet above sea level require 16% more air, or draft, than at the level of the ocean, and about 35% more at 10,000 feet altitude.

FOR photographing mines and mills a lens should be of as long focus as possible. For a 5x7 plate it should be about 8½ inches focus. Celluloid films give better results than plates.

PROBABLY the Mercur district, Utah, is the best American example of what metallurgical triumphs the cyanide process has won. It has created the prosperity of that section.

A DOUBLE ENGINE having cylinders 22 inches diameter and 42 inches stroke, steam pressure 80 pounds, when raising 3000 pounds of coal 300 feet in twelve seconds, develops 136.3 horse power.

ORDINARILY there is in good dynamite moisture to the extent of ½ to ¾ of 1%. A strong smell of nitric acid around where dynamite is stored suggests the advisability of its immediate destruction.

READERS will do us and their fellow workers some service by sending, whenever convenient, some notes of their experience in practical work. The value of such knowledge lies largely in the publicity given it.

STEAM is said to be superheated when its temperature is higher than that corresponding to the pressure at which it is generated, and has a reserve of heat that it can afford to lose before it comes to the condensing point.

THERE is a California State mining bureau, headquarters at San Francisco, and a Colorado mining bureau, with headquarters at Denver; but, so far as known, no county in either State maintains a local mining bureau.

IF not too expensive for the expected results, a solidly built dam is always to be preferred. A poorly constructed dam is often the dearest in the long run. Unless intended for the most temporary use, an earth dam is rarely advisable.

WITH few exceptions the large and handsome structures in San Francisco, Denver and Salt Lake City are the results of profit in mining, and the bulk of the manufacturing and industrial enterprises in those three cities had their start from the same source.

A TRIPLE EXPANSION ENGINE with four cylinders is usually made with one high pressure cylinder, one intermediate and two low pressure cylinders. A quadruple expansion engine may have one high pressure and two each of intermediate and low pressure.

IT may be taken as a general law in the development of engineering practice in all lines that, at first, attention is mainly centered on mere accomplishment; and then, as the principles come to be better understood, they are examined in detail for efficiency of operation.

WHERE one tries relocating a mining claim on the theory that a former location was forfeited by failure to do the necessary amount of work thereon, the burden is on the relocator to prove such failure in an action by the former locator to determine the right of possession.

THE rates for refining gold are the same at the Denver and San Francisco mints, and have been repeatedly published herein. The charges for refining at the Selby Smelting & Lead Works, San Francisco, conform to those of the two government institutions mentioned.

DRIFT MINING is peculiar to California on this continent, but is duplicated in every detail in Australia, where cement and blue gravel is followed under the lava capping. Some California drift mines have yielded as high as $2.50 gold per cubic yard of material handled.

IF a number of adjoining claims can be developed through a tunnel to which the claims are contiguous, the required assessment work for all the claims can be done by work on the tunnel, the amount of such work in the tunnel to be equal to that required for all the adjoining claims. But if there are any of the claims that are not plainly susceptible of development by such tunnel work, separate assessment work must be done on or for each of them.

A LONG-STROKE ENGINE is by many considered the better for ordinary, every-day work. In that type the stroke is about twice the diameter of the cylinders, 20x48 inches, or 16x30. The most economical engine to buy is one whose rated horse power is a little more than the power required.

"LIQUID STEAM" is the somewhat suggestive but misleading name applied to a principle in use in a hot water motor whose promise has so far outrun its performance. In the motor referred to the power is generated from superheated water kept in a liquid state by strong compression.

CUSTOM crystallized into law ordains that where an original locator resumes work on a mining location that he had previously located, but which was about to lapse, if he continue and complete the required annual assessment work, he does not forfeit the claim and the ground is not open for relocation.

WHERE in miners' tools the steel has worn down to the iron, a simple test to determine whether it is iron or steel is to let fall a drop of dilute nitric acid on the bright surface of the metal. If steel, a dark spot will show—the harder the steel the darker the spot; if iron, the surface will not be altered.

THE average wear of shoes and dies in a gold stamp mill is dependent upon the manner in which the ore is fed, its hardness, and the make of the shoes and dies and the drop of the stamp. The wear varies from four to twenty ounces of metal per ton crushed, in the shoe, to three to eight ounces in the die.

IT is not considered geologically possible for petroleum or its derivatives to rise from one formation to another, the principal deposits being sealed in the containing strata. Surface indications are principally due to numberless fractures by which the contents of the porous rock can reach the surface.

IN assaying native bismuth the assay suitable for sulphide of antimony could be employed; a sample of bismuth residue would require cyanide of potassium, salt, potash and carbonate of soda, testing the result of the fusion for other metals. In case of bismuth alloy wet assay or analysis would be requisite.

SECRECY is sometimes considered a characteristic of unsuccessful "processes," possibly unjustly. It is, however, to be said that there is no "secrecy" about any successful ore treatment. As a rule, "secrecy" and success are incompatible. The greatest requisite element of commercial success is wide publicity.

THE Western Chemical Works, Denver, Colo., produce practically pure sulphur from ore from Gunnison county, Colo. The Peyton Chemical Co., recently organized, propose to produce sulphur and sulphuric acid at Martinez, Cal. "Blue vitriol" in large commercial quantities is manufactured as a by-product at the Selby Smelting & Lead Works, Selby, Cal.

IT is no difference if $200 or $2000 in work or improvements were put on an unpatented mining claim in any twelve months, there must be $100 put on the claim during each calendar year till a patent is had. But all money so spent counts in the necessary $500 worth of work and improvements, and whenever that much in total has been expended application for patent may be made.

ON Sept. 23, 1876, 63,135 cubic yards solid rock were completely demolished by one discharge at Hell Gate, East River, New York. There were 4427 charged holes, each containing mercury fulminate fuse and charges of dynamite. There were 49,914 explosions used in one blast. Batteries were used to generate the current, and each battery exploded 160 charges. This was the record blast.

THERE is no prescribed shape for placer locations; the claim need only "conform as nearly as practicable with the U. S. system of public surveys and the subdivisions of such surveys." Two locators can jointly locate forty acres of placer ground, three sixty, and so on, up to eight locations, 160 acres, which is the limit. One mineral discovery on any twenty of the 160 acres is sufficient for that entire area.

ORDINARILY in the practical working of a mine lease the royalty is calculated from the returns as given in the settlement sheet of the ore buyer. From the share due to the lessees is deducted the haulage, tramming, hoisting, sharpening, timber and supplies. The company may advance the supplies at cost and do the hoisting and pumping. In that case if the work prove unprofitable the loss is likely to be on the company.

BRIEFLY the method of working the frozen creek claims in the Yukon is by steam thawers. A small boiler is generally used, from which the steam is passed through rubber hose, to the ends of which pointed steel tubes about 4 feet in length are affixed. The latter are driven into the frozen gravel, and steam is forced through them for six or eight hours. They are then withdrawn and the thawed material removed.

SYENITE differs from granite in having little or no quartz, and, hence, a lower percentage of silica, which varies from 45% to 65%. It consists essentially of orthoclase feldspar and hornblende, pyroxene or mica, hornblende being the most common; and while dark mica (biotite) is not uncommon, the light mica (muscovite) is rare. There is generally a greater proportion of the basic feldspars than in the granite. The term "syenite" was formerly used for what is now called hornblende granite. True syenite is not as abundant nor as widely distributed as granite.

REGARDING the inquiry as to Fahl ores from a Denver miner in the issue of the 23rd ult., a Utah miner writes that, if sufficient silver is contained in the ore in question, a chloridizing roast with salt, followed by pan amalgamation, or lixiviation with hyposulphite solutions, would give profitable result, even including the inevitable loss of silver in roasting with salt. The suggested process is in use at the Ontario mine, in Utah, where all the details could be furnished.

IT would be unwise to seek work at present in South Africa. There was little demand just before cessation of work at Johannesburg, and there is little likelihood of immediate resumption. About the time hostilities began white miners' wages averaged about $80 per month. Unless one had an engagement in some prominent capacity at a contracted price for a specified time, it would be folly to think of going there in connection with mine work at present. But when work does resume there will be a probable "boom."

TO MAKE blue print solution, dissolve one ounce of citrate ammonia of iron in six ounces of water and in a separate bottle dissolve the same quantity of ferrocyanide of potassium in six ounces of water. Keep the solutions separate in a dark place. To prepare the paper, mix equal quantities of the two solutions and spread evenly over the surface with a sponge or soft brush. Always use fresh mixture if good results are desired. Keep solutions separate in stone bottles, corked, and mix only enough for immediate use at any one time.

DISSENT is expressed by several regarding the "Concentrate" in the issue of Feb. 2, which read as follows: "It is believed that the loss of gold in water used in stamp milling is too infinitesimal to take into account." Despite such dissent, however, such belief is founded on experience and maintained. Of course, normal conditions and ordinary milling practice are considered. If a millman should feed lumps of cyanide of potassium into the mortar, he must expect that an appreciable percentage of the gold will dissolve and pass off in the water.

THE new California law regarding charges in the office of the Secretary of State for filing articles of incorporation of mining and other corporations provides that the following shall be charged: For filing articles of incorporation, if the capital stock amounts to $25,000 or less, $15; if the capital stock amounts to over $25,000, and not over $75,000, $25; over $75,000, and not over $200,000, $50; over $200,000, and not over $500,000, $75; over $500,000, and not over $1,000,000, $100; over $1,000,000, $150; for filing articles of incorporation without capital stock, $5; recording articles of incorporation, 2 cents per folio; issuing certificate of incorporation, $3; filing certificate of increase of capital stock, $5 for every $10,000, or fraction thereof, of such increase; filing certificate of decrease of capital stock, $5.

IN the Wetherill magnetic separator, by the power of its magnets and concentration of the magnetic field, substances are attracted not ordinarily affected by a common magnet. In one type of this machine the two magnets have a strength of 40,000 ampere turns; by the peculiar shaping of the pole pieces, all this force is concentrated into a space the size of half a leadpencil. The powdered ore is carried on a belt under the poles of an electro-magnet. Just over the belt and under the magnet pole, is a second belt, running crossways. When the ore passes under the magnet, the magnetic particles of it rise and are held by the magnetic force to the under side of the upper belt. This belt carries them out of the field of the magnet, and they then drop into an appropriate receptacle. Meanwhile, the unmagnetic ore goes through the same treatment again, to insure a thorough separation, and is dumped into another receiver. It is thus rendered possible to separate minerals, which are attracted by a magnet, from those which are not, and even to separate those which are attracted in different degrees.

PROOF SILVER is prepared in the U. S. Mint by subjecting fine silver (.999) to electrolysis, using an electrolyte of silver nitrate with 1% of free nitric acid. The bar of fine silver is carefully wrapped in filter paper and all enveloped in cotton cloth, so as to perfectly retain the impurities, such as peroxide of lead, etc., which accumulate as the bar is dissolved. The bar so protected is connected with the positive pole of the battery or other source of electricity, thus becoming the anode, while the cathode is formed by connecting a sheet of chemically pure silver to the negative pole. The silver is thrown down as crystals, which are easily washed. In this way pure silver, even in large quantities, can be easily prepared. In melting the crystals the same flux is used as in the case of gold—three parts fused borax and one part pure niter—but it is necessary to melt the bar a second time. The second melting is made without flux, and is for the purpose of removing the oxygen introduced by the niter of the flux. When the silver is perfectly melted, it is stirred with a piece of dry wood as long as the action due to the presence of oxygen continues. When this subsides, the silver is poured into a chalk-lined mold. The bar is cleaned with a brush and dilute H_2SO_4. After being rolled out, it is ready for use.

Petroleum Oil Pipe Lines.

Written for the MINING AND SCIENTIFIC PRESS by A. S. COOPER, California State Mineralogist.

The problems which arise in the construction of pipe lines for water are also applicable to pipe lines for petroleum.

Owing to the fact that there are so many petroleum oils having different degrees of fluidity and that the fluidity of any oil depends largely upon its temperature, empirically ascertaining the flow of oil through pipe lines in the same manner as has been done with water would be a difficult and almost endless task. Even the changes in the temperature of the atmosphere would greatly affect the flow of oil. Consequently the flow of water (the fluidity of which is but slightly affected by changes of temperature of the atmosphere) has to be taken as a standard from which by comparison the flow of petroleum oil can be approximately determined.

When the fluidity of the petroleum oil is ascertained, then by comparing it with the fluidity of water the flow of the oil through pipe lines can be determined.

If a certain quantity of water in a given time flows through a pipe line, one-half as much petroleum oil half as fluid as water will flow through the same pipe line in the same time. Viscosity is a property which may be regarded as the converse of fluidity. Tables that give the flow of water through pipe lines are to a great extent applicable to the flow of petroleum oil through pipe lines, when the viscosity or fluidity of the water and oil are compared.

By the following table (No. 2) it will be seen that at a temperature of 200° F., the heavy petroleum oils will flow from ten to forty times quicker through an orifice than when the oil is at a temperature of 60° F.

Table number 2 gives results obtained with Redwood's standard viscometer, showing the viscosity or fluidity of petroleum oil at different temperatures; also the viscosity of water.

TABLE NO. 2.

VISCOSITY SECONDS FOR 50 C.C.

RESULTS OBTAINED WITH REDWOOD'S STANDARD VISCOMETER.

Temperature.	AMERICAN MINERAL OIL.			RUSSIAN MINERAL OIL.		
	Sp. G. 0.885	Sp. G. 0.913	Sp. G. 0.923	Sp. G. 0.909	Sp. G. 0.915	Sp. G. 0.884
50	145	425	1030	2040	2520	.....
60	105	295½	680	1235	1980	.....
70	90	225	485	820	1320	.....
80	73	171	375	580	900	.....
90	63½	136	262	426	640	.....
100	54	111	200	315	440	1015
110	50	89½	153	226	335	739½
120	47	78	126	174	245	531
130	44¾	63½	101	135½	185	398½
140	41	58	82	116	145	3:7½
150	37½	52	70½	95	115	230
160	.....	46	63½	83½	93½	200
170	.....	.....	5$	70½	77½	161
180	.....	.....	52½	61½	67½	134½
190	.....	.....	47	56½	61	115½
200	.....	.....	42	48½	54	99¼
210	.....	.....	40	.....	.....	85
220	.....	.....	38	.....	.....	77
230	.....	.....	.....	.....	.....	70½
240	.....	.....	.....	.....	.....	64½
250	.....	.....	.....	.....	.....	59¼
260	.....	.....	.....	.....	.....	54
270	.....	.....	.....	.....	.....	48½
280	.....	.....	.....	.....	.....	46½
290	.....	.....	.....	.....	.....	44½
300	.....	.....	.....	.....	.....	42⅔

The following table, number 1, has been prepared from the formula given by Thomas Box in his work on practical hydraulics. The table has been changed from English to American gallons.

"To find the diameter of the pipe requisite, having the length of pipe in yards, the head of water in feet and the gallons per minute: Divide the given head of water in feet by the given length in yards, and the nearest number thereto in the table opposite the given number of gallons will be found the required diameter.

Thus to find the diameter for 132 gallons per minute with 56 feet head, the length being 273 yards, we have $\frac{56}{273}$=.205, looking for which in the table opposite 132 gallons we find it 3 inches, the diameter sought.

In constructing a pipe line the consideration of the hydraulic grade is of great importance. Money will be saved by laying pipes of the requisite diameter and no larger.

A hydraulic grade line is the hypothenuse of a triangle the base or horizontal side of which is the length of the pipe line and the vertical side the length or height of the intake above the discharge A B in figures 1, 2 and 3 show a hydraulic grade.

In constructing an oil line of piping three cases may arise by reason of the inequalities of the ground to be passed over.

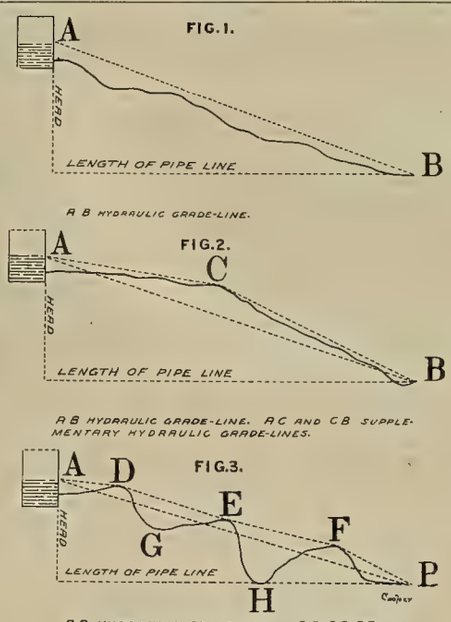
1. The pipe line may lie below the hydraulic grade line.

TABLE NO. 1.

TABLE OF HEAD OF WATER CONSUMED BY FRICTION WITH PIPES 1 YARD LONG.

DIAMETER OF PIPE IN INCHES.

AMERICAN GALLONS PER MINUTE.	2	2½	3	3½	4	5	6	7	8	9
1.2	.00012	.000042	.000016	.0000078	.000004	.....	.....	.....	.....	.....
2 4	.00051	.000168	.000067	.0000313	.000016	.....	.....	.....	.....	.....
3.6	.00115	.000379	.000152	.0000705	.000036	.....	.....	.....	.....	.....
4.8	.00205	.000674	.000271	.000125	.000064	.....	.....	.....	.....	.....
6.0	.00321	.001053	.000423	.000195	.000100	.....	.....	.....	.....	.....
7.2	.00463	.001517	.000609	.000282	.000144	.....	.....	.....	.....	.....
8.4	.00630	.002064	.000830	.000383	.000106	.....	.....	.....	.....	.....
9.6	.00823	.002696	.001084	.000501	.000257	.....	.....	.....	.....	.....
10.8	.01041	.003413	.001372	.000634	.000325	.....	.....	.....	.....	.....
12.0	.01286	.00421	.00169	.000783	.000401	.000131	.000052	.000024	.000012	.0000069
24.0	.0514	.01685	.00677	.00313	.00160	.000526	.000211	.000097	.000050	.0000278
36.0	.115	0.3792	.0152	.00707	.00361	.001185	.000476	.000220	.000113	.0000627
48 0	.205	.06742	.0271	.01253	.00641	.002003	.000804	.000372	.000191	.0001060
60.0	.321	.1053	.0423	.01958	.01004	.003292	.001323	.000612	.000314	.0001742
72.0	.463	.1517	.0609	.02820	.01446	.004741	.001905	.000881	.000452	.0002569
84.0	.630	.2064	.0830	.03839	.01969	.006453	.002593	.001200	.000615	.0003415
96.0	.823	.2696	.1084	.05014	.02572	.008428	.003386	.001567	.000803	.0004460
108.0	1.041	.3413	.1372	.06346	.03255	.010667	.004286	.001983	.001017	.0005645
120.0	1.28	.421	.169	.078	.0401	.01317	.005292	.00244	.001256	.00069
132.0	1.55	.509	.205	.094	.0486	.01539	.006403	.00296	.001519	.00084
144.0	1.85	.606	.243	.112	.0578	.01896	.007620	.00352	.001808	.00100
156.0	2.17	.712	.286	.132	.0679	.02225	.008943	.00413	.002122	.00117
168.0	2.52	.825	.332	.153	.0788	.02581	.010372	.00480	.002461	.00136
180.0	2.89	.948	.381	.176	.0904	.02963	.011907	.00551	.002826	.00156
192.0	3.29	1.078	.433	.200	.1028	.03371	.013547	.00626	.003215	.00178
204.0	3.71	1.217	.485	.226	.1161	.03806	.015293	.00707	.003629	.00201
216.0	4.16	1.365	.549	.253	.1312	.04267	.017146	.00793	.004069	.00225
228.0	4.64	1.521	.611	.282	.1450	.04754	.019104	.00884	.004534	.00251
240.0	5.14	1.685	.677	.313	.1607	.05268	.021168	.00979	.005024	.00278
252.0	5 67	1.858	.747	.345	.1772	.05807	.023337	.01080	.005538	.00307
264.0	6 22	2.039	.819	.379	.1945	.06374	.025613	.01185	.006079	.00337
276.0	6.80	2.229	.896	.414	.2126	.06966	.027995	.01295	.006644	.00368
288.0	7.40	2.427	.975	.451	.2314	.07585	.030402	.01410	.007234	.00401
300.0	8.03	2.633	1.058	.489	.2511	.08221	.033075	.01530	.007850	.00435
312.0	8 69	2.848	1.145	.529	.2716	.08902	.035773	.01655	.008490	.00471
324.0	9.37	3.071	1.234	.571	.2929	.09600	.038578	.01785	.009156	.00508
336.0	10.08	3.303	1.328	.614	.3150	.10325	.041489	.01920	.009847	.00546
348.0	10.81	3.544	1.424	.658	.3379	.11075	.044506	.02059	.010562	.00586
360.0	11.58	3 792	1.524	.705	.3617	.11853	.047628	.02204	.011304	.00627
372.0	12.35	4.049	1.627	.752	.3855	.12655	.050856	.02353	.012070	.00699
384.0	13.16	4.315	1.734	.802	.4115	.13486	.054190	.02507	.012861	.00713
396.0	14.00	4.589	1.844	.853	.4376	.14342	.057630	.02669	.013677	.00759
408.0	14 87	4 871	1.958	.905	.4645	.15224	.061175	.02831	.014519	.00805
420.0	15.75	5.162	2.075	.959	.4923	.16133	.064827	.03000	.015386	.00853



2. The pipe line may lie above the hydraulic grade line.

3. The pipe line may lie both above and below the hydraulic grade line.

Case 1.—Pipe line below the hydraulic grade.

Measure the length of the pipe and the head above the mouth of the pipe. These measurements will furnish a grade from which the diameter of pipe line necessary to carry a given amount of oil may be calculated.

Case 2.—Pipe line above hydraulic grade—Figure 2.

There is now a decided loss of head and the varying capacity of the pipe very much diminished if it be of the same diameter throughout. The pipe line from C to B will carry off the oil faster than the pipe line from A to C, and will in fact act like a gutter and be partially empty. To remedy this put in a pipe line having a decreased diameter from C to B or put in pipe line having an increased diameter from C to A. To calculate the requisite diameter of the pipe line A C assume that it ended at C; and of the pipe line C B assume that it commenced at C, the point where it is highest above the hydraulic grade line.

Case 3.—Pipe line both above and below the hydraulic grade line.

Divide the pipe into sections for every summit it makes above the hydraulic grade line D E F. The first section will have a head equal to the vertical distance between A D. All succeeding heads will be measured from the summit above to the next summit below, as follows: D to E, E to F and F to B. These measurements will furnish a series of heads and grades from which the diameter of pipe necessary may be calculated.

Like water, all oil contains some air; all oils also hold a certain amount of natural gas in solution. When oil has passed through a pumping engine into a force main under great pressure, it absorbs some of the gas or air in the air chamber. When the petroleum is heated by the heat of the atmosphere or otherwise, gas is generated. When oil is forced by a pump or gravity along a pipe having vertical curves and summits at different points, it parts with some of the air or gas at these summits. In time sufficient air or gas will accumulate at each summit to occupy a considerable part of the sectional area at that point, obstructing the flow of the oil, and it will continue to accumulate until the velocity of the oil is sufficient to carry the air or gas forward down the incline.

At such summits, D E F (Fig. 3) an air or gas valve is required to let off the accumulated air or gas.

When pipes are being filled there should always be ample escape for the air or gas at the summits, or the air or gas contained in the pipes will be compressed and recoil, again be still more compressed

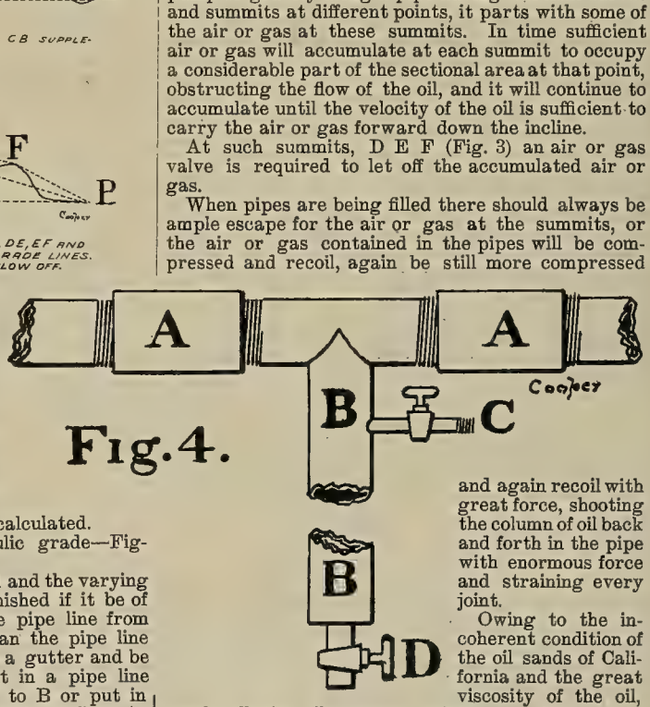


Fig. 4.

and again recoil with great force, shooting the column of oil back and forth in the pipe with enormous force and straining every joint.

Owing to the incoherent condition of the oil sands of California and the great viscosity of the oil, nearly all the oils contain sand, salt and water in greater or less quantity. These can be to a great extent removed in a settling tank. The sand, salt and water remaining in the oil settles in the lower points of the curve of a pipe line having vertical curves. Blow-

off valves and pipes should be placed in these depressions, G H (Fig. 3), so as to flush out the sediment and water that is deposited from the oil. If the sediment and water are allowed to remain in the pipe they will retard and obstruct flow of oil through the pipes.

A design for a blow-off is shown in Fig. 4. A A is the oil pipe line; BB a pipe to catch the sediment and water. In order to save oil, water is pumped into the main pipe with a hand pump attached to the cock C. If there is any oil in the pipe B it is floated out by the water; the water also floats the oil out of the depression, so that when the blow-off cock D is opened water and sediment will be discharged and but little oil. If the pressure is so great that a hand pump cannot be used, the pipe line should be emptied as far as possible, then water should be poured into the pipe line near the summit of the vertical curve that is above the depression which is to be blown off. After the oil is replaced by the water the sediment can be removed through the blow-off without loss of oil.

Curves and bends in pipes diminish the flow of oil. An angular bend should be avoided. The larger the radius of the bend the better.

Extraction of Copper and Zinc.

TO THE EDITOR:—Regarding the article written on the above subject by Dr. J. Ohley, in his mention of the use of niter cake—a by-product in making sulphuric or nitric acid—I do not find his statements verified. Sodium sulphate is not a solvent of any reliable power, and niter cake also, as specified, is better, but only so far as it contains free sulphuric acid. Before much money is spent upon a process like this, it is better to erect a small working plant of, say, 300 pounds capacity, and work carefully for some time such ores as are intended to be treated; much valuable information will be gained and all weak points of the process found out and improved.

What Dr. Ohley states about the Leblanc process is valuable in a high degree, and, with all our electrical inventions, this method of manufacturing sodas and bleaching powder has not been amended for cost of production and the quality of its products. Besides these, there have been quite a lot of improvements since Leblanc's day, as, for instance, in the condensation of the HCl gas from the furnace, the saving of the heat in the Glover tower and the niter in the Gay Lussac; the better and cheaper production of bleaching powder by improvements in the Stills & "Weldon" regeneration of the manganese used. There are also revolver furnaces for the black-ash-making improved caustic soda appliances, and last, though not least, recovery of the sulphur from the waste—done at a cost of less than 20 shillings per ton of the sulphur obtained—which sells to-day at over £5 per ton; one works with which I am acquainted produces over 200 tons per week. But to obtain good working results it is needful for the works to be systematically arranged and properly erected, the employment of good workmen, an intelligent managing foreman and general overseer. Then there should be no difficulty for a works so erected and managed to pay 30% profit. This the writer knows has often been earned when such works were built and arranged as stated, and worked as a private concern, not a federation of works, such as are going here to-day. These do not, and can not, work as systematically and profitably as separate concerns have done, and much disappointment and loss of money has been caused thereby. I quite think with Dr. Ohly that this system is well worth the consideration of American capitalists and would prove a great boon to that delightful country.

So far as regards the fate of its inventor, Leblanc, went, it is very sorrowful, indeed, and inventors of to-day find, like he, that their worst enemies are the so-called chemical scholars and analysts of the F. C. S. fame. Not a word of sympathy or help need such expect unless the latter are well paid in fees and rewards, and, if these come nimbly along, then any kind of thing they will help to foist upon the public. The writer is now speaking within the limits of his own experience and knowledge, confirming the saying that "the way of the inventor is hard."

One or two words on the extraction of copper and zinc: Copper has been extracted from low-produce ores here in England, and most successfully and cheaply by the "wet process." This has been going on with results far better than those named in the issue of Dec. 29th, and at a cost of fuel and labor surprisingly low, after "burning" the ore for the manufacturers of sulphuric acid, and is still working, no better method having come to the front. Zinc extraction by "wet" methods and "dry" processes are being tried here, but up to to-day nothing done on a large scale is satisfactory. One is patented, however, which does overcome the difficulties of its predecessors and turns to account the various metals gold, silver, lead, zinc and sulphur when present in the ore. "Dry" working by the Fry & Everett process or Ellerhausen's system fall very far short of satisfaction to the science world, and also to those immediately concerned. These are items of interest also to many in the United States, as well as here.

JAMES W. WORSEY,
Chemist and Metallurgist, St. Helens, Lancashire, England.

The Jeffrey Air Power Longwall Mining Machines.

The accompanying illustrations show the latest design of air Longwall mining machines, manufactured by The Jeffrey Manufacturing Co. of Columbus, Ohio. Figure 1 shows a partial front view and Figure 2 a partial rear view of the machine, which is of the disc or wheel type and self-propelling.

Some of the main features of this machine are: First—It runs on a single rail, the side thrust being taken by special ties and light screw jacks, the use of one rail reducing to a minimum the liability of jumping the track. Second—It cuts its own floor—that is, cuts on the floor level. It can be built, however, to cut at any height from the floor that local conditions require. Third—The disc or cutter wheel can be tilted up or down by means of a hand wheel at the front end of the machine (see Fig. 1), so that sulphur balls or other obstacles can be passed over or loosened if met with in undercutting, or on an uneven floor the irregularities can be easily followed. Fourth—The machine is designed to be operated from the front end, which enables the operator to lay his rail ahead of machine, see that the roof and face are safe before the machine approaches and leaves more room in the rear for handling rails and spragging the coal. Fifth—The feed mechanism (see Fig. 2) is driven by an eccentric on the outer end of the main drive shaft at the rear through a ratchet and pawl to a winding drum located on the front end, giving the operator ability to start, stop or change the rate of feed at will without stopping the engine. The rates of feed that are possible are 8″, 15″ and 21″ per minute. Sixth—The machine is constructed of steel throughout, with the exception of the engines, which are of cast iron. The engines are 9x8-inch cylinders, designed to develop 25 H. P. with 40 pounds of air at the machine, and are provided with cast steel crossheads connecting rods and crank discs. It is claimed that under favorable conditions this machine will cut from 600 to 800 lineal feet face per day. Further information will be given interested parties by the manufacturers.

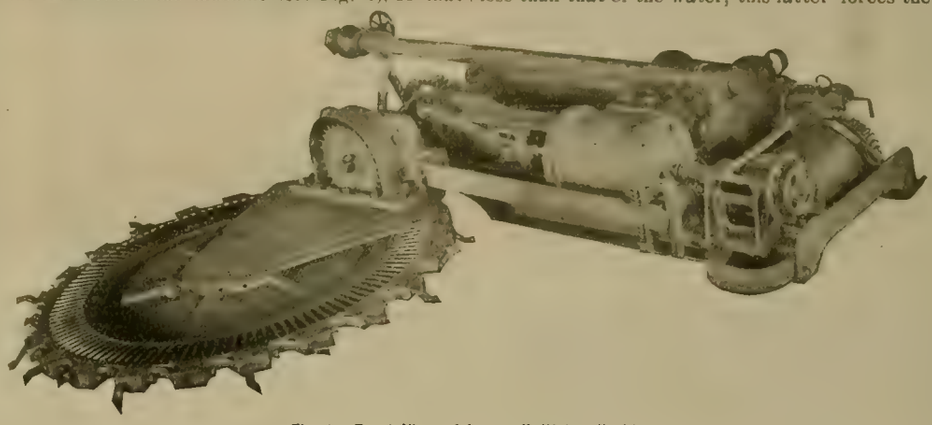


Fig. 1.—Front View of Longwall Mining Machine.

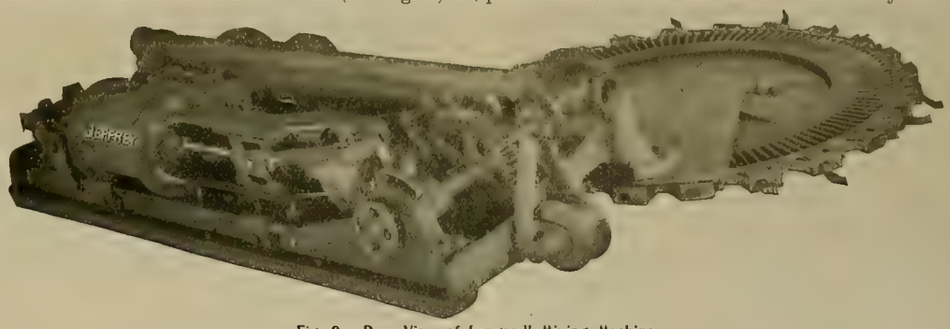


Fig. 2.—Rear View of Longwall Mining Machine.

THE Wm. P. Miller cyanide process (patented) consists essentially in dividing or separating the coarser material from the slimes, and collecting the slimes in cakes by expressing the waters by means of a filter press. The press is then opened and the compressed slimes containing gold and silver drop into an agitating vat or vessel in which is introduced a solution of cyanide of potassium in the desired quantity and requisite strength, forming a pulp. The mass is continuously agitated by machine power to bring the particles of matter or material in contact with the cyanide solvent. The gold and silver pass into solution as gold and silver cyanide solution. The contents of the agitating vat or vessel are then forced through a filter press. The intent is that the gold and silver cyanide solution shall leave the press as a clear liquor. It is then run into cells or vessels in which the gold and silver are to be precipitated by zinc or other process of recovery. The residue remaining in the press is then washed by forcing water through with the object of freeing it of any remaining cyanide gold and silver solution, and reconveyed into a receptacle to be strengthened for further use.

A Cement Casing for Oil Wells.

In a paper read before the Baku Technical Society, by S. Trop, the following remarks are made concerning the use of cement in protecting petroleum wells from water:

In every petroliferous bore hole two directly opposite forces are in action—that coming from below upwards, the pressure of the oil column, and that from the top downwards, the column of water formed by water constantly forcing its way through the pipes from the outside. When the flow of petroleum and the pressure of gases are stronger than that of the water in the well, the latter is forcibly ejected, and the bore fills with oil, and there is little difficulty in exploiting the petroliferous strata. But when the reverse is the case, and the pressure of petroleum is less than that of the water, this latter forces the oil back, prevents its rising in the bore hole and interferes with the exploitation work, which is only possible when the bore hole is isolated from the surrounding water-containing strata. At the present time, owing to the exhaustion of part of the petroliferous strata of the Apscheron Peninsula, and also to the petroleum gases which find a free exit through the wells already in existence, the pressure in the petroliferous strata has been considerably diminished, and in many places it is only possible to obtain an abundant flow of oil after the careful isolation of the bores from water has been effected. It is therefore not surprising that the question of the methods of isolating petroleum wells from water has lately occupied the first place among questions relating to boring engineering. The method generally adopted in the work has been by introducing a filling of Portland cement.

This cement, mixed with water, is poured into the interstices between the two columns of casing, where it becomes solidified, and forms a waterproof covering which prevents the water from penetrating into the well. The methods adopted in this instance are well known, and it is only necessary to mention that the difference in the diameter of the two columns, between which the cement is inserted, must not be less than 4 inches. For this purpose, as is well known, one strip of casing is cut out and removed from the bore at a depth of from 35 to 40 feet above that inserted last. Where it is possible to insert a filling of cement, it is undoubtedly the most convenient and cheapest method. This cement wall lining the inside of the bore hole serves the two-fold purpose of keeping the water out of the well, and practically removing the downward pressure of the water.

In many cases where the strata surrounding the core are pervious, the water sinks down through them and helps to force the oil up through the bore hole. Cement in such a position does not set readily, and great care should be exercised in adding the proper amount of water and allowing plenty of time to elapse before the pump is started for the cement to harden. When the casing is once properly set, it forms the most durable method of lining a bore hole that has ever been tried.

RUSSIA has levied a 30% increased duty on American machinery, steel and iron goods.

The Manufacture of Uranium Compounds.

Written for the MINING AND SCIENTIFIC PRESS by DR J. OHLY.

The only minerals deserving consideration under this head are carnotite and uraninite or pitchblende, which occur in sufficient quantities in nature to allow of commercial treatment. The first named is to be considered as a potassium-sodium vanadio uranate of the composition $K_2UO_4NaVO_3$, and the second consists of a mixture of the two oxides UO_2, $2U_3=U_3O_8$. Both of them are frequently contaminated with foreign admixtures, among them pyrite, which is often found associated with pitchblende, and a number of other metallic compounds, which usually accompany carnotite, as shown by the analysis of the latter given below. Uraninite is known to occur, and has been mined in the Wood mine and German lode of Gilpin county, Colorado, while carnotite has been located in commercial quantities only in Paradox valley, Montrose county, of the same State, near its southwestern boundary and that of Utah. There are, however, indications showing that deposits of carnotite and pitchblende will soon be located in other States, since the writer is in possession of information from mining men in California, Washington and New Mexico, which are of a very promising nature.

The great drawback, however, in the locating of further deposits of this kind consists in the circumstance that but very few of the miners and prospectors outside of Colorado have had an occasion to study the characteristics of the minerals under consideration, since these men usually live at great distances from localities where mineralogical collections are kept for public inspection, and are consequently handicapped in their investigations by the impossibility of obtaining a thorough knowledge of these bodies. The eagerness of this class of people to post themselves in this regard is, however, remarkable and praiseworthy, and, in cases of this kind, the writer has often taken occasion to forward samples and information in the expectation that the connection thus established might lead to further locations of yet unknown deposits. In connection with these remarks, the writer can not refrain from stating that this expectation has been quite recently realized (and, in fact, while he was sketching the present article) by the receipt of a package containing a sample of real carnotite from Inyo county, California.

It is very deplorable, however, when considering these facts, that no State or Government institution has as yet been established with a view of furthering the mining interests of the United States by sending out small samples of valuable and little known minerals for the purpose of enabling miners and prospectors to study and fix their characteristics, so as to assist them thereby in the discovery of new deposits. Perhaps the problem could be brought to a speedy solution in a similar manner in which the advancement of the agricultural interests of the country has been accomplished—that is, by inducing representatives of the mining States of the Union to forward samples of this kind on application. Since the acquisition and storage of a few hundred pounds of each of these minerals requires but a very limited outlay, and the amount of ore mentioned is sufficient to supply all prospective applicants, when subdivided into a few ounces each, the benefits accruing to miners and prospectors will be almost incalculable, when considering the possibilities which must necessarily arise in the wake of such succor.

Returning after this pardonable deviation to our subject, it must be borne in mind that according to the investigations made by the Government chemist, Mr. Hillebrand, which were published in the issue of the MINING AND SCIENTIFIC PRESS of August 25, 1900, the treatment of carnotite by dilute acids does not result in a complete decomposition of the mineral. To facilitate matters for the reader, however, and in order to present the points under consideration in one cast, we will repeat below the analytical results obtained by Mr. Hillebrand in part:

U. S. GEOLOGICAL SURVEY—REPORT OF ANALYSIS. CARNOTITE, ROCK CREEK, NEAR PARADOX, MONTROSE COUNTY, COLO.:

SOLUBLE IN DILUTE ACIDS.

UO_3	52.25
V_2O_5	18.35
K_2O	6.73
Na_2O	.09
Li_2O	None
CaO	2.85
BaO	.72
MgO	.20
PbO	.25
CuO	.20
Fe_2O_3	1.77
Al_2O_3	1.08 app.
TiO_2	.10
H_2O 105°	2.59
H_2O 350°	3.06
H_2O redness	None
CO_2	.33
SO_3	.12
P_2O_5	.33
As_2O_5	.25
MoO_3	.23
CrO_3	Trace
	91.50

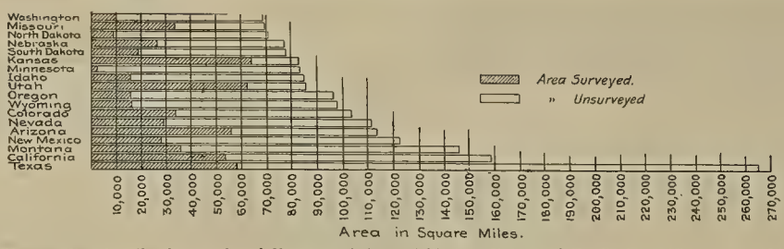


Diagram Showing the Surveyed and Unsurveyed Area of Western States and Territories.—(See page 121.)

INSOLUBLE PARTS.

SiO_2	5.18
TiO_2, Al_2O_3	1.15
P_2O_5	.09
V_2O_5	.26
K_2O	.26
Na_2O	.04
Li_2O	Trace
Cr_2O_3	Trace
H_2O 150°	.56
H_2O 312°	.32
H_2O redness	.48
	8.34

A closer examination of these data will reveal the fact that the large percentage of uranium in this high-grade ore was completely extracted by means of the dilute acids employed, and that most of the vanadium values contained in the ore entered into the solution, excepting a small fraction of 0.26% of vanadium pentoxide, representing a loss of 5.2 pounds for the short ton. It might appear, therefore, that, in case it is intended to treat an ore of this class for its uranium contents alone, this purpose might be accomplished by bringing the mineral into solution through the addition of dilute nitric acid, for example, and the subsequent heating of the mixture. The high price of the former, and the necessity of employing an excess of it, which must be largely oversaturated subsequently by the addition of sodium carbonate, so as to keep the uranium in solution—an operation which is to be followed by the boiling, filtering and final precipitation of the uranium compound in solution through caustic potash, soda or ammonia—contribute, however, to render this process very expensive, and hence of little commercial value.

Among the other acids which might find application instead, sulphuric and hydrochloric (muriatic) acids are worthy of consideration, since both of them are less expensive than nitric, and can be procured to advantage in almost any locality of the country. The first acid mentioned is, furthermore, known among chemists as the most energetic, while the second shows a quite remarkable affinity for the vanadium present in carnotite, so that on its addition to a sample of the same the blood-red coloration of the chloride in solution becomes immediately apparent. Either of these two acids is, therefore, to be preferred to nitric acid in the commercial extraction of the mineral carnotite, while pitchblende requires a somewhat different treatment, as will become apparent from the communications following.

The carnotite having been brought into solution in the manner indicated, the values of uranium are precipitated from the liquid by the addition of caustic soda, where a compound containing sodium uranate to about 23%, besides iron, alumina and lime, results, which is washed with water, dried, pressed into bricks and sent in that form to brokers in New York, who attend to its transportation to Germany, where the uranium values are extracted, and the product is refined to the oxide U_3O_8, or to the hydrated sodium salt of varying composition. It would, of course, be much more profitable to refine the material operated on in place, so as to produce either the sodium salt or the oxide in a state of approximate purity, but, to judge from existing conditions, the process for the manufacture of these articles on a paying basis has not been brought to perfection as yet, so that the production of the crude compound forms unto the present the only alternative to be chosen.

Though the foregoing statement is a truthful one, and can be verified by actual facts, there cannot be any doubt but that continued research will develop a method sufficiently inexpensive to allow of the commercial manufacture of the uranium oxide and sodium salt. Not only will this be accomplished in the near future, but the ready and cheap separation of vanadium from uranium, and the preparation of almost chemically pure oxides of the two metals at moderate expense will soon be an accomplished fact, so that the realization of the points considered is merely a question of time.

To prevent, however, a wrong impression being formed as to the usual percentage of uranium in the ores occurring at the mines, it must be known that the average values of uranium oxide in them seldom surpasses the figure 6, while the mineral analyzed by Mr. Hillebrand is to be considered as a picked sample of extraordinary fineness. A perusal of analyses made by the writer on average samples from the various claims in Paradox valley will make this point more clear, and it will be realized then that under prevailing conditions low-grade ores of this kind are not apt to bear transportation, and should, therefore, be concentrated or refined in place. Hence the erection of a mill in localities of such character as to allow of the manufacture of the uranium compound mentioned for several years appears to be the proper plan, though shipments to European ports of high-grade uranium ores have been made to advantage in former years.

(TO BE CONTINUED.)

Internal Corrosion of Wire Ropes.

Thos. G. Lees, in the Transactions of the Federated Institution of Mining Engineers, says:

"Corrosion as applied to wire ropes means a gradual eating away of the substance of the wire, the metal being converted into oxide of iron, etc. It is entirely distinct from abrasion and cannot be mistaken for it. Shaft waters differ greatly in composition, some being very harmless and others very corrosive, but the best of them in connection with air may cause corrosion.

"There are various stages of corrosion, beginning with a very slight pitting which is scarcely perceptible, but if disregarded the wire soon becomes very much reduced in strength. If the bright surface of the wire is pitted it has been found that a great part of its strength has been lost. This peculiar action has in the past not been fully recognized and failure has often been attributed to the inferiority of the wire. It is usually due to the action of moisture in the form of steam or water alone, or with the addition of furnace gases.

"There are three points in a winding rope where it has been found from experience that corrosion usually takes place, first, at the cap end of the rope; second, where the ropes rest on the pulley when the cages are at the top and bottom respectively; and third, on the underlapping rope at the drum. At the second and third of these points, the strands of the ropes are opened more or less, due to the bending over the pulleys and under the drum, thus allowing water to enter more easily at these points than at other parts of the rope, but it is at the cap end that the wires suffer most, and this is probably due to the fact that every time the cages settle on the props or keep at the pit top and at the pit bottom, a certain amount of slack rope allows freedom of motion for the wires to untwist and bend, and thus the strands open somewhat and allow the water to percolate into the inside of the rope.

"If all the failures of winding ropes could be ascertained, it would be found that by far the greater number occur within a few feet of the cap from a variety of causes, and not necessarily from corrosion alone. Owing to many of the accidents causing no loss of life or personal injury, official records are not obtainable. In the opinion of the writer, the only practical way of dealing with this part of the rope is periodically to cut off a few feet and recap the rope. It is hardly necessary to give the advantages of a systematic recapping of ropes, but the two most important are: 1. By cutting off a few feet of the rope the inside strands can be thoroughly examined and treated, and, if found in good order, the cap may be put on again. 2. Letting out the rope from the drum to replace the length cut off, changes the position of the pulleys where the greater strain has to be taken when lifting from the bottom. It is advisable under ordinary circumstances to cut off about 12 feet from each rope.

"The operation is simply this: One rope, after being recapped, is lowered by the engine man and attached to the cage, and this causes the other rope to be 24 feet too short, so that it has to be let out from the spare rope provided and kept coiled around the inside of the drum. Thus each rope is allowed 12 and 24 feet alternately at each recapping. Sufficient spare rope is allowed for in ordering a new rope to provide for recapping, in addition to the two rounds of rope which must be left on the drum. In sinking shafts it may be an advantage to cut off a greater length than in ordinary cases of winding ropes, as the ropes are subject to more bending and twisting near the cap end, and to varying strains in addition to the corrosive action of the water.

"This corrosion takes place even when the rope is thoroughly lubricated, and the lubricant on the outside may cover up flaws and deceive the inspector of the ropes, and it is impossible by the usual system of outward inspection to discover the internal condition of the rope. The old hempen core ropes were par-

ticularly subject to corrosion, but the efforts to overcome it in the wire core ropes have not been entirely successful. One of the best preventives of corrosion is the galvanizing of the wires. As a result of a number of tests made by the writer, he found that a failure in strength in galvanized wire is so small as to be practically of no importance."

Mining and Metallurgical Patents.

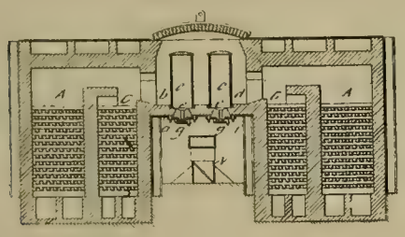
Patents Issued February 26, 1901.

Specially Prepared for the MINING AND SCIENTIFIC PRESS

ORE SEPARATOR.—No. 668,742; W. A. Redding, Macon, Ga.

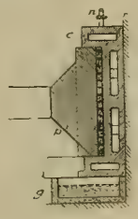
Combination with downwardly convergent water vessel, one side overflow trough, perforated water compartment opposite side level of overflow, valved pipe supplying water to compartment, means for discharging material, and for producing air current between discharge point and compartment in direction of trough.

CRUCIBLE AND CRUCIBLE FURNACE.—No. 668,803; A. Reynolds, Sheffield, England.



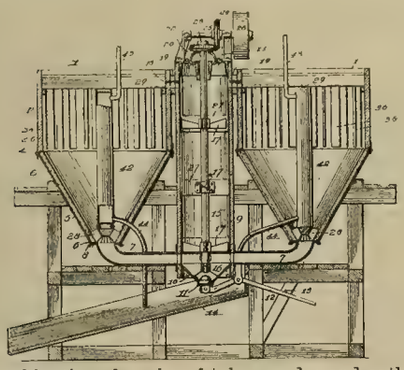
Crucible furnace having refractory hearth, vertically extending tubular crucible with open lower end seated on hearth, removable refractory plug extending through hearth beneath crucible having tapping hole, supporting plate for plug, closure for lower end of tapping hole.

PROCESS OF MANUFACTURING ZINC AMALGAM PLATES.—No. 669,007; G. T. Eyanson and A. J. Shinn, Philadelphia, Pa.



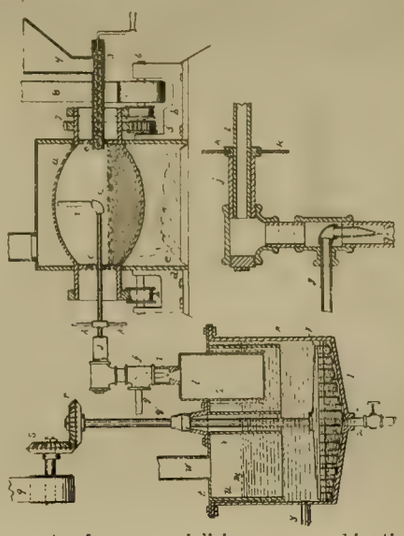
Of making battery plates, process consisting in placing amalgam of zinc with supporting grid in mold, subjecting same to pressure, applying heat to mold and to amalgam during operation.

APPARATUS FOR ELECTROLYTICALLY EXTRACTING AND DEPOSITING GOLD AND SILVER FROM THEIR ORES.—No. 668,842; A. M. Rouse, Denver, Colo.



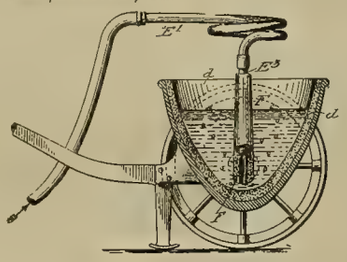
Combination of series of tubs, anodes and cathodes arranged therein, agitation tube having communication with tubs at upper and lower ends, agitator in tube having means by which ore pulp to be treated may be elevated therein, perforated conduits located in upper ends of tubs adapted to receive ore pulp from tube and discharge it into tubs.

AMALGAMATOR.—No. 668,643; T. H. Hicks, Fort Wayne, Ind.



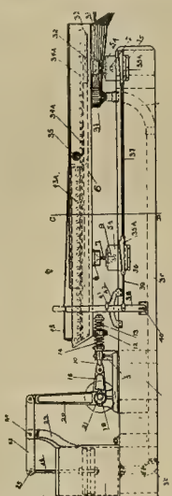
Apparatus for mercurializing ore, combination of retort to contain ore and mercury, means for vaporizing mercury, adjustable pipe extending into retort to empty retort of contents, retort provided with opening for admission of air, suction mechanism connected to adjustable pipe, for emptying retort of its mercury and ore, water condensing tank for collecting mercury and ore, condensing tank provided with outlet pipe for escape of air taken into retort by suction mechanism while emptying.

DESULPHURIZING COPPER MATTE. — No. 668,952; G. C. Carson, Castella, Cal.



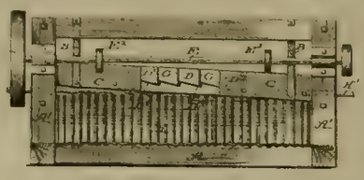
In combination with pot for receiving molten metal, flexible hose for conveying air, in combination with rigid extension thereof having coil, adapted to be inserted into pot and metal contained therein, coil being arranged over pot.

CONCENTRATOR.—No. 669,038; S. W. Traylor, Denver, Colo.



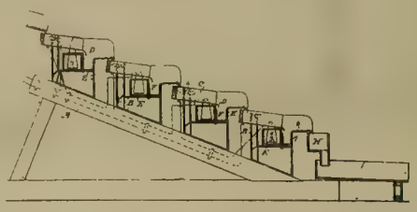
Combination of vibratory concentrating table having opening at rear extremity, screen covering opening and adapted to receive concentrates from concentrating surface table, chamber mounted on table below screen opening, stationary reservoir suitably located with reference to table, conduit connecting reservoir with chamber on table, arranged to permit movement of table, plunger located in reservoir, suitable means for simultaneously imparting necessary movement to table and reciprocating movement to plunger, whereby pulsations are imparted to water in chamber causing it to pass up and down through screen.

ORE CONCENTRATOR.—No. 668,980; C. A. Christensen, Oretown, Or.



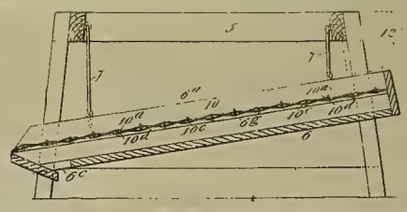
Ore concentrator plan having sides flared outward, bottom formed of integral sheet bent into straight, transverse, parallel ridges and grooves forming riffles, having series of holes in each riffle, triangular baffle plates arranged oppositely, in pairs, set vertically parallel with riffles, extending from sides inward toward each other.

ELECTRIC AMALGAMATOR.—No. 669,058; L. H. Barricks, San Francisco, Cal.



Combination of inclined plane, supports attached thereto carrying upon horizontal edges vertically partitioned amalgamating trough forming two cells, one adapted to contain saline solution, other mercury, one cell having extended shallow end, vertical extensions of supports or brackets above trough, journal boxes adjustably fitted thereto, sluice box having journals near one end fitting journal boxes, means for adjusting incline of sluice box, metal plate within projecting beyond sluice box, dipping into mercury containing cell, plate forming cathode electrically connected with anode within solution containing cell through porous partition and contacting fluids.

CONCENTRATING APPARATUS.—No. 669,043; A. K. Cross, Denver, Colo.



In concentrator, combination with suitable frame, of table mounted thereon composed of flat strips having their adjacent side edges in contact, separated transverse wires or rods with which strips are interwoven to form cells having side openings, but no vertical outlet, means for imparting vibratory movement to table at right angles to length of longitudinal strips.

Fuller's Earth.

Fuller's earth, which contains a large amount of silica, often as high as 70%, is the name given to that earth or clay which is capable of absorbing from newly made cloth the oil which has been used to render the wool pliable in weaving, or fulling. This constitutes its chief characteristic. Hence the physical properties rather than any chemical composition constitutes a fuller's earth, and these properties should be as follows: A soapy feel, showing it capable of absorbing grease and oils; fine texture, with no grit that could injure the cloth in rubbing; should crumble easily in water and mix readily with it. Unlike most clays, it exfoliates when burned, and hence cannot be used in making bricks.

Among its many uses may be mentioned its employment for filtering mineral oils instead of lampblack, and to some extent for lightening the color of cottonseed oil, although for the latter and for vegetable oils generally the English earth is still preferable. The crude black mineral oil is allowed to percolate slowly through the dry, finely ground earth placed in cylinders, whence it issues quite white in color, and at first samewhat thinner. The oils apparently percolate at different rates, according to their densities, and it is suggested to make use of this fact for the fractional separation of crude oils into their various qualities, instead of distilling.

Fuller's earth generally occurs in large, shallow basins in swampy tracts. Below the 1 or 2 feet of surface soil is a layer of mottled plastic clay 2 to 6 feet thick, and then the fuller's earth in layers from 2 to 12 feet thick above a bed of sand. After being dug out it is allowed to dry in the sun for several days, losing 50% of its weight and turning from a greenish color to a creamy white.

MINING SUMMARY.

Specially compiled and reported for the MINING AND SCIENTIFIC PRESS.

ALASKA.

The recent decision of Judge Brown of the U. S. District Court of Alaska, in which he held that Port Valdes should be the recording town of Cook Inlet and other mining districts in that section, is strongly opposed by the miners in that region, as it will now require a trip of 500 miles to record. Heretofore recording has been done in the heart of the camp on Turnagain Arm. A petition, praying for a resident recorder, is circulated.——A similar decision, rendered by Judge Wickersham of the Yukon district, ruling that miners of the Koyokuk should record at Eagle City, hundreds of miles distant, is also meeting with opposition.——One thousand sacks of ore were recently shipped from the White Eagle group at Ketchikan.——The Industrial Co., J. M. Scott manager, has fifty men working on its property on Copper Inlet, Prince of Wales island.——Work will resume at the Copper Mountain.——The Last Chance M. Co. will begin operations on its property, in the Porcupine district, this spring.

ARIZONA.

COCHISE COUNTY.

The Toughnut, at Tombstone, is producing ore.

GILA COUNTY.

The crosscut tunnel on the Wild & Woolly, north of Globe, is expected to cut the vein at a depth of 125 feet.——The shaft on the Tip Top No. 1, same locality, is down over 100 feet.——J. Henry has leased the Big Johnnie, 2 miles north of Globe, and will begin work on same immediately.——The Copper Hill group is reported sold to a Boston company.

MARICOPA COUNTY.

The Pacific Petroleum Co., Ltd., capital $300,000, is incorporated at Phœnix.

MOHAVE COUNTY.

C. D. Pickering is pushing work on the San Francisco at Cedar.—— At Cerbat J. Barry will start work on the St. Louis. M. McCorkle will erect a custom mill in the San Francisco district.

At Chloride the Tennessee mill is ready to start; oil will be used as fuel.——A strike is reported on the Lucky Girl, near Chloride. Ore is said to run 1000 ounces silver to the ton.——A. L. McKesson is operating an arrastra at White Hills.

There are 200 men employed in the mines at Chloride.——A body of good ore is opened up in the Elkhart, at Chloride.——The new hoist at the Empire is in place.

J. Buckhard of Los Angeles, Cal., has twenty men working on his property in Gold Road district, near Kingman.——The main shaft on the Tennessee is down 500 feet. Forty-eight men are employed.——The shaft on the Pinkham, near Chloride, is down 220 feet.——The Empire, Chloride, is now using oil as fuel.——Fisher & Flynn will sink the shaft on the New Jersey, near Chloride, an additional 200 feet. A new 1500-foot shaft will be started on the Elkhart, near Chloride; Supt. and General Manager Comstock.

PIMA COUNTY.

A body of good ore is opened in the Harrisburg, in Black Rock district, near Florence.

YAVAPAI COUNTY.

The Vulture, near Phœnix, is sold to W. B. Troy and others of New York, who will put in new machinery and develop the property on a large scale.

CALIFORNIA.

AMADOR COUNTY.

Capt. Glenn is operating his hydraulic mine near Volcano.

BUTTE COUNTY.

One hundred and sixty acres of land near Honcut are bonded to a dredger company.——The Keystone driller now operating near Smartsville will be brought to Honcut and operated on land near there. Should tests prove satisfactory, a dredger will be put in.

CALAVERAS COUNTY.

The Central Hill Gravel M. Co. has resumed operations on its property near Murphys.——There are 100 tons of ore at the Rose Rock, on Indian creek, near Murphys, awaiting transportation to the Heinsdorf mill at that place.——The May Day M. Co. has suspended operations in its tunnel.——The engine from the south shaft of the Angels, at Angels, is going in on the main shaft; it has a capacity of working to a depth of 1000 feet; shaft will be sunk an additional 200 feet.——J. G. Black, of Dunedin, New Zealand, is making experiments with his new process for extracting gold from sulphurets without the use of chlorine gas at the Lightner plant at Angels. —— There is $171,496 worth of ore computed to be in sight at the Seminole, near Carters.——The Zeile, at Jackson, recently closed down owing to a break in the hoisting machinery, etc., has resumed operations.——The new tank at the Kirkwood, Jackson, is completed and sinking is resumed.——A 12-foot vein of good milling ore is reported on the 600-foot level of the Shenandoah, at Plymouth. 500 feet south of the present shaft; Supt. Thornton will run an upraise from this point to the surface and sink a working shaft there.——The bond on the Saint Lawrence (the Brunner), at Albany Flat, is forfeited.——Vance & Mobley Bros. will sink the shaft on their property in Bear gulch, near Jenny Lind, now down 90 feet, to the 300-foot level.——A body of good ore is opened up in the Hoover & Voight, in Bear gulch, at a depth of 40 feet.——The Golden Eagle, near Jenny Lind, is bonded to Angels parties; work will begin shortly.——The old Ilex, at Rich gulch, which has lain idle for thirteen years, is being reopened by J. O. Stewart.——Reports from Sheep Ranch state that the mine and mill at that place will start up again.——Operations on the San Justo, on Carson creek, near Angels, which was recently flooded with water, may be resumed soon; a new shaft will be sunk farther down the creek.

In the issue of the 16th ult. the Lightner chlorination plant at Angels was reported closed down. This was a mistake, as the same has been in continuous operation since the middle of last December, as have also the mine and mill.

EL DORADO COUNTY.

The old Spreckels, near Fairplay, has resumed operations. Ten men are employed.——The mill at the St. Clair, near Kelsey, is running steadily, crushing fifteen tons of ore daily.——Brown Bros. are pushing work on the Mt. Pleasant at Grizzly Flat. Thirty men are employed.

W. Rhinbold is sinking a 160-foot shaft on property near Garden Valley.——Supt. J. Sipp is pushing work on the Atlanta, east of Spanish Flat.——Work is in progress on the Em, near Kelsey.

INYO COUNTY.

A 100-ton concentrating plant will go in at the Reddy mines, near Darwin, this spring; C. D. Rooklidge, manager.

KERN COUNTY.

At Ludlow the Barstow mill is now running.——The Red Dog mill is running on ore from Mojave. A recent run of the mill on 50⅜ tons of ore from the Butte, near Randsburg, Supt. McMahon, returned two bars of bullion, aggregating $4525.——The Black Mt. Oil Co., capital $500,000, is incorporated at Randsburg, to work 1440 acres land near there.——The Monte Cristo Oil Co., operating in the Kern river field, has begun the erection of a 30,000-barrel storage tank near Kern City.——The Junction Oil Co. has put up a derrick on well No. 5; wells Nos. 3 and 4 are producing 400 barrels oil per day.——Five wells of the California Standard Oil Co. are now producing 400 barrels oil per day.

MARIPOSA COUNTY.

The Hite Cove M. Co. is pushing work on its property, near Cove; mine is unwatered. The new cyanide plant is running smoothly and 33,000 tons of tailings will be treated; thirty-five men are employed.——The Mariposa mill, at Mariposa, is running steadily.

The new mill going in near Mariposa is completed.——Mining operations are in progress near Princeton and Bear Valley.

MONO COUNTY.

At Jordan, part of the works at the Castle Peak are shut down owing to scarcity of water.

NEVADA COUNTY.

A sand plant will be erected at the Mountaineer, near Nevada City, to save slimes for reworking on the concentrators.——At the Campbell, Nevada City, will be built a new 10-stamp mill.——The new machinery for the Canfield (formerly the old Mistletoe), near Rough & Ready, is about placed; Supt. C. Graham.

The suits between the Pennsylvania and Grass Valley Exploration companies, Grass Valley, have been set for trial in the United States Circuit Court for the Ninth Circuit, in San Francisco, on April 16. Both are for damages and trespass, each company claiming the ground upon which the other has been working. The Grass Valley Exploration Co., owning the W. Y. O. D., sues for $100,000 from the Pennsylvania; the Pennsylvania sues for $600,000 from the W. Y. O. D.

PLACER COUNTY.

The Big Gun, at Michigan Bluff, is running steadily.

The Bob Lewis No. 2 (gravel), near Colfax, comprising the blue channel between the Hidden Treasure and Red Point mines, is sold to H. M. Jarvis, representing a Philadelphia company, for $20,000; new owners will run a tunnel to tap the channel from Drummond canyon.——J. Giles, representing Oakland men, is running a tunnel on property on the North Fork, southeast of Cisco.

Work is progressing satisfactorily on the Paragon, at Bath.——Three shafts are sunk on the Three Stars, near Ophir, one of them being 1100 feet deep; work is begun on erection of a stamp mill; E. J. Kendall, Supt.——More men are put on at the Star, near Ophir; work is being pushed.

PLUMAS COUNTY.

Thomas & Bunson will put in a hoisting plant on their property at Emigrant Hill, and will sink a shaft to open up a gravel channel.——A hoist will also go in on the Bushman (gravel), near Quincy, operated by Delano & Hazzard; a shaft will be sunk and mine will be worked through that, instead of through the tunnel now on the property. —— Gobert & Lesher have bonded the Bushman (quartz) mine and mill, same locality. They will soon begin crushing ore now on the dump. It is stated that, if results are not satisfactory, the mill will be moved to the Crown Point, east of Quincy.——Work on the Plumas Imperial No. 2, near Quincy, will begin shortly, and it is thought that operations can be carried on until late in the year, owing to great amount of snow on the mountains.——The Portuguese company will push work on property on Mill Creek, south of Quincy, this spring. —— The Jamison M. Co., operating near Johnsville, has fifty men employed.——More men will probably be put on at the Four Hills, near Quincy, and work will be pushed.

RIVERSIDE COUNTY.

The San Jacinto Oil Co. has struck oil in its well near Moreno at a depth of 645 feet.

SAN BERNARDINO COUNTY.

The Quartette M. Co., operating north of Blake, on the Colorado river, has its 20-stamp mill running steadily. A narrow gauge railroad is to be built from the mines to the mill; manager, B. Macready.——Operations at the Searchlight, same district, are being pushed by Manager G. M. Rose.——The Keystone, Arctic New Era, Mondanun and Annette mines are shipping ore.——T. C. Pern, operating in same district, will put in new machinery this spring.——The turquoise mine, north of Blake, is being developed.

SAN DIEGO COUNTY.

The well of the Monarch Oil Co., near San Diego, is down 960 feet; it will be drilled to a depth of 1500 feet.——The tunnel now being driven to convey water from Santa Ysabel creek to the placers in Hatfield canyon, near Ramona, now in 1300 feet, will be run an additional 300 feet.

SAN LUIS OBISPO COUNTY.

Guild & McKeon Bros., operating the Mahoney or O'Toole (quicksilver), near Adelaide, have two benches of retort pipes running steadily.

The Karl Quicksilver M. Co. is pushing work on the Sunderland or Dubost (quicksilver), same district.——R. Scott of San Jose is building a 60-ton per day Scott furnace at Adelaide.

SHASTA COUNTY.

The first roast of ore at the new smelter at Bully Hill, near Redding, consisting of eighteen tons, was roasted last week.——The Utah & California Oil & Dev. Co. of Salt Lake, Utah, is incorporated at Redding, to work Kerosene Flats, 4 miles from Ono.——The Phœnix Land & Oil Co., capital $11,000, is incorporated, to work 2000 acres patented land in Stinking Canyon, Sand Flats and Ono districts.

The suit of the Balaklala M. Co. vs. the Iron Mountain Investment Co.. has been set for trial for March 21 before a jury. The suit is to quiet title to the Balaklala mine and for $25,000 damages.

SIERRA COUNTY.

York Bros. & Hart, who have been operating the Bald Mountain Extension, near Downieville, have suspended operations owing to severe weather.

SISKIYOU COUNTY.

Mining operations are in progress in and around the Salmon river section, near Yreka, water being plentiful.——A company is being formed by J. W. Downing & Co. to work property near Ash Creek, on the Klamath river.——The Kunz Flat (hydraulic), at Hamburgh, on Klamath river, owned and managed by J. S. Lowden, Jr., is running steadily.

The mill at the Cherry Hill, in Cherry Creek district, is being put in shape for a run. —— Operations at the Fernandez Hydraulic, same district, are under way.——All placer claims in this district are reported working.——In Gazelle district, the Dewey mill is running on Dewey ore.——More men are put on at the La Flesh, in Henley district.——Preparations are under way at the Downing, same district, for the erection of a mill.——Another ditch will be constructed at the Siskiyou Hydraulic, near Callahans.——Work is under way at the McKean.——The Jordan Placer, in Cecilville district, will start this month.

Hydraulicking is under way on the various streams and gulches emptying into the Klamath river.

Boston capital will push work on the Black Bear mine. There are three claims—free-milling quartz ore in black slate formation—16-stamp mill complete, water power, etc. John Daggett has the management.

TRINITY COUNTY.

Bowie & Dedrick will soon begin the erection of a mill on their claim, near Junction City.

TUOLUMNE COUNTY.

Operations at the Philadelphia Diggings, near Columbia, will soon begin.——The old Snell, on Knights Creek, near Columbia, is being examined by J. D. Howe of San Francisco.——Operations on the Bown, near Tuttletown, are closed down; Supt., W. J. Rule.——The Li Hung Chang, in Jawbone district, near Carters, is reported sold to Barrett & McGovern of the West Side Flume & Lumber Co.——A number of men were laid off at the Dead Horse, near Carters, last week.

The 10-stamp mill on the Hope, at Sonora, is closed owing to lack of water.——The Hard Tack group, near Sonora, is reported bonded to O. A. D'Arcy of San Francisco.——Operations are under way on the Free Gold & Haley mines, 2½ miles east of Jacksonville.

YOLO COUNTY.

Oil with a paraffine base is reported found in the foothills, near Ramsay.

COLORADO.

BOULDER COUNTY.

The Wood Mountain M. Co. is shipping $100 ore from its property near Wall Street.——Ore from the Franklin, operated by same company, is said to be running from $60 to $250 to the ton.——The shaft on the Gold Lode, at Wall Street, is down over 100 feet; ore is said to be running $100 to the ton.——Work is resumed on the 300-foot level of the Forest.——At the Poorman group, near Sunshine, the tunnel is in 500 feet.——Tellurium ore running from $500 to $1000 to the ton is reported recently opened up on the Terror, on Spencer mountain, near Eldora; Manager Shepperdson. —— The Lady Grace, on Spencer mountain, is being developed by a third tunnel.

CHAFFEE COUNTY.

The Cebolla G. M. Co. has taken over the Longfellow, in Longfellow gulch, below Salida, and will develop it. A whim is going in, men will be put on and work pushed ; Supt. W. O. Parker.

CLEAR CREEK COUNTY.

Operations are to be resumed on the Atlantic-Pacific tunnel, at Silver Plume. This tunnel was begun about 1882, and 7140 feet were driven, 5540 feet on the Atlantic slope and 1600 on the Pacific slope, when operations were suspended, leaving about 4½ miles to be driven.——The thirty-ton concentrating plant of the Silver Mountain M. Co., at Empire, will run on ore from the Gold Dirt properties on Silver mountain, near there.——Sixteen claims on Breckenridge mountain, near Empire, are bonded to R. S. Grier.——Another strike is reported made in the Smuggler shaft at Silver Plume; ore runs about 30% lead and twenty-seven ounces silver to the ton.

DELTA COUNTY.

Work on the Dominquez (copper) at Delta is progressing.

DOLORES COUNTY.

The Carlie lease on Nigger Baby hill, near Rico, is shipping high-grade ore.——The Atlantic Cable group, Rico, is producing 200 tons of ore daily.——Work is under way in the Miller & Poindexter tunnel, on C. H. C. Hill, near Rico.

GILPIN COUNTY.

A new 35 H. P. boiler will go in at the Lillian, Russell district.——The January output of the Kansas-Burroughs Con. Co., P. McCann manager, is given as 2979 tons, or 331 cords, crude ore from the Kansas and Burroughs claims, near Central City.——The Patch M. Co. is shipping ore from the Hidden Treasure and main workings of the California, on Quartz hill.——A bucket tramway is to go in from the Carr mine and Colorado Co.'s property, in Lake district, to the company's 50-stamp mill at Black Hawk.——From the Perigo at Perigo ore is being shipped to the Perigo rapid drop 30-stamp mill at that point.——The Iron City rapid drop 25-stamp mill at Black Hawk will start up again.——Drifting and stoping are under way in the 300-foot level of the Cœur d'Alene property on Academy hill, near Central City, operated by the Rapidan M. & M. Co. of Pittsburg, Pa.——The Chicago-Carr, in Gregory district, is shipping ore regularly. Double shifts are working and the new

plant is working smoothly; B. M. Meyers manager.

GUNNISON COUNTY.

The East River G. M. & M. Co., operating 2½ miles northeast of Gothic, near Gunnison, has opened up 4 feet of ore running 45 ounces silver and from $8 to $12 gold to the ton in the 280-foot lower tunnel; ore is said to be good for concentrating, and the company may put in a plant.

HINSDALE COUNTY.

The Champion M. Co., operating in Burrows Park, will put in a plant of machinery this spring.——A 200-foot crosscut tunnel is run on the Illinois Boy, in Burrows Park, 22 miles from Lake City, operated by W. Myers, of Ouray; main pay streak is said to be from 16 to 24 inches wide, and ore is said to carry gold, silver and copper; two cars of ore recently shipped to the Argo smelter returned $279 per car.

LAKE COUNTY.

The shaft on the Vega, at Leadville, will be sunk to the 1000-foot level.

MONTEZUMA COUNTY.

Eighteen claims near Mancos were recently sold to J. N. Doyle and others of Denver. The new owners will begin work early in the spring.

PARK COUNTY.

The No End, on Mt. Bross, near Alma, is leased to W. H. Bean.——A strike of good ore is made on the Minks lease on the Champagne, Alma.——The Goldore Co. contemplate the erection of a mill near Alma this season.

ROUTT COUNTY.

J. A. Connell and others, operating near Steamboat Springs, have put in a pump and will push work.——The Northwestern Oil Co., whose plant was recently destroyed by an explosion, has resumed operations.

SAN MIGUEL COUNTY.

The Tom Boy M. Co., Manager Herron, will put in additions to its mill at Telluride this spring.——On the 23rd ult. the buildings at the mouth of the crosscut tunnel of the Japan at Telluride were destroyed by fire, as were also an electric motor and drill plant.

SUMMIT COUNTY.

At Kokomo, Denver men are working the Bledsoe.——Work is temporarily suspended at the Sellers, owing to matter of wages.——Progress is being made in driving the Union Con. tunnel.——The Maximus, near Kokomo, has an altitude of 12,300 feet.

TELLER COUNTY.

The estimated output of the mines of Cripple Creek for the month of February is given at 48,700 tons of ore, which yielded $2,058,000 in gold bullion, as follows:

Mills.	Tons.	Value.
Colorado-Philadelphia	9,000	$ 353,000
Bi-Metallic	9,300	230,000
Economic	4,000	120,000
El Paso	3,000	75,000
National	6,000	225,000
Union	5,500	150,000
Smelters	12,500	875,000
Miscellaneous	....	30,000
Totals	48,700	$2,058,000

During the same period there were $181,000 paid in dividends by mines of the district.——Work is to resume on the Ollie, on Signal hill, Cripple Creek.——The Red Spruce M. Co. will put in a plant at the main shaft of the Red Spruce.

The Federal G. M. Co., Cripple Creek, is putting in three electric hoists on its property on Galena hill; a 15 H. P. hoist will go in on the Little Bess.——The bailing system recently put in at the Elkton, at Cripple Creek, to clear the mine of water in eight days, not proving a success, the company will put in duplex sinker pumps, with a capacity of 1500 gallons per minute; men are at work on the fifth and sixth levels. As soon as water is out the company will put in a twenty-five drill air compressor.——The new trolley system connecting the Gold Coin mine and the Economic mill through the Columbine tunnel at Cripple Creek is completed, and is now hauling ore.——The 5-foot vein recently opened up on the 400-foot level of the Mabel M., at Cripple Creek, has dipped out of the shaft at the 420-foot level; a crosscut will be run at a depth of 450 feet to strike it again.——At Victor, sinking is in progress on the Atlanta, the main shaft now being down over 400 feet.——A station is cut on the 100-foot level of the Little Frank S., at Victor, and shaft will be continued to a depth of 200 feet; three shifts will be employed; Supt. Swisher.

IDAHO.

ADA COUNTY.

The Seager & Coryell G. & S. M. Co. of Idaho, organized in New Jersey, has filed articles of incorporation at Boise.

BLAINE COUNTY.

Manager Hollister is pushing work on the Hattie Golden Star and Jumbo mines, near Hailey, and is putting in a 20-stamp mill on each of them.

BOISE COUNTY.

The Leviathan mill, at Pearl, recently ran on twenty tons of ore from the Dewey properties, near there.——The new roller mill of the I. X. L., at Pearl, is shut down temporarily, owing to lack of fuel.——New dredging machinery is going in near Idaho City; R. Winters, Supt.

OWYHEE COUNTY.

A. Buckbee, manager the Cumberland, at Silver City, reports the mine making regular shipments of bullion; at the mill the concentrating tables are removed and stamps and pans only are being used.

SHOSHONE COUNTY.

Five feet of high-grade concentrating ore are reported opened up in the tunnel of the Leslie, near Wallace.——The Douglas group of five claims, on Pine creek, 7 miles above Wardner, in Yreka district, is bonded to J. Goodrich of Spokane, Wash., for $60,000. A company, to be known as the St. Paul & Idaho M. Co., will be incorporated to work the property; men are being put on and work will be pushed under Supt. P. C. Stoess.

WASHINGTON COUNTY.

The Black Lake M. Co., E. D. Ford manager, will do extensive work on its properties near Weiser this season.

MICHIGAN.

HOUGHTON COUNTY.

The annual report of the Baltic M. Co., Houghton, shows that during the last six months of 1900 the yield of refined copper per ton of ore crushed was 21.44 pounds. It is estimated that 1000 tons of ore will be crushed daily by the latter part of the summer.

The annual report of the Tamarack M. Co., Houghton, shows that during 1900 there were 766,058 tons of ore mined, of which 625,422 tons were crushed. Total receipts were $3,299,077 and total expenditures were $2,099,935, leaving a profit of $1,199,142. Up to Dec. 31, 1900, No. 5 shaft, which was started Aug. 7, 1895, had reached a depth of over 4662 feet, and had cost, including equipment, etc., $663,508. Total work for 1900 is given as follows:

	Feet.
Sinking	1,008
Drifting on the conglomerate	4,115
Drifting on the Osceola amygdaloid tributary to No. 1 shaft	1,473
Crosscutting	2,477
Total	9,073

MONTANA.

BEAVERHEAD COUNTY.

The twentieth annual report of President and General Manager H. Knippenberg of the Hecla Con. M. Co., operating at Glendale, shows a net cash profit of $36,471.55 for 1900.

CASCADE COUNTY.

A recent order of the court stopping operations at the Comanche at Great Falls threw 150 men out of employment.

FERGUS COUNTY.

The upper tunnel in the Mammoth, in Warm Springs district, near Gilt Edge, is in 125 feet.

GALLATIN COUNTY.

Ore from the Sunshine group, in Springhill district, runs 30% copper.

GRANITE COUNTY.

L. U. Loomis, representing New York parties, will probably begin work on properties near Philipsburg.

MADISON COUNTY.

The new concentrator of the Red Chief M. Co., at Red Bluff, is running.——At the Red Bluff, Red Bluff, a new 10-drill air compressor is in place; mine will be pumped out and work pushed; work on new concentrator will begin shortly.

MEAGHER COUNTY.

At Copper, formerly Copperopolis, 18 miles northeast of White Sulphur Springs, Supt. J. B. Gallagher is pushing work on property near there; 100 men are employed, and shaft is down 500 feet.

YELLOWSTONE COUNTY.

The Colorado coal mines, at Billings, Supt. T. Graham, will probably be reopened shortly.

NEVADA.

LINCOLN COUNTY.

The new 25-stamp mill at El Dorado City is completed and has started up.

LYON COUNTY.

The ledge in the Logan & Hulley, near Dayton, is reported to be 32 feet wide; ore is expected to run about $10 to the ton.

WASHOE COUNTY.

In Olinghouse canyon, near Wadsworth, 1200 feet of work is completed in the Ora; a 30-foot crosscut is run from a point 150 feet in the main tunnel; 300 tons of ore on upper dump are expected to return $1500.

The deal for the sale of the old Jones and Kinkead, at Pyramid, to New York parties, is about completed; price to be paid is about $25,000.

NEW MEXICO.

COLFAX COUNTY.

Ore recently opened up in the Bobtail and Senate mines, at Elizabethtown, operated by Pittsburg, Pa., men, is running $500 to the ton.

GRANT COUNTY.

A new furnace is going in at the reduction works at Silver City; it will be blown in about April 1st.——Operations are under way on the 160-foot level of the Wild Cat, at Santa Rita; main working shaft is being retimbered and a hoisting and pumping plant will go in soon.

LINCOLN COUNTY.

Work is resumed on the South Homestake, at White Oaks.——A vein of rich ore is reported struck in a drift west of the main tunnel in the Boston Boy, same district.

SIERRA COUNTY.

Work is in progress on the Ben Harrison No. 2, at Fairview.——A pump and hoist will go in on the May, on Monument creek, near Fairview.

TAOS COUNTY.

High-grade ore is reported opened up in the Shoofly, on Placer creek, near Red River.

The Rio-Hondo Copper Co. will put in a 50-ton mill, preliminary to building a 100-ton mill on its property, 35 miles from Tres Piedras. The company will build an electric railroad from its mines to Tres Piedras.

OREGON.

BAKER COUNTY.

Ore from the Red Jacket, Huntington, runs from $2 to $60 to the ton.

New machinery is going in on the Quebec, in Red Boy district, near Sumpter.——The shaft in the Red Boy will be sunk to the 2000-foot level.

JACKSON COUNTY.

Perkeypile Bros. are pushing work on their property, near Gold Hill.——The Big Giant, on Sardine creek, near Gold Hill, is sold to C. R. Ray, of same place.——A strike is reported made in the Crown Point, on Blackwell hill, same district, operated by Shaffer & Herbert.

One hundred and eighty acres of land, a 5-stamp mill, water rights, etc., near Jacksonville are sold to J. W. Opp of Jacksonville for $25,000. Mr. Opp also has an option on the Gold Standard, adjoining, upon which is a 10-stamp mill and a 500-foot tunnel. Mr. Opp will build a $100,000 reduction plant on the Gold Standard and expects to have it in operation by July 1. The plant will include crushing rolls, concentrators and a cyanide department.

JOSEPHINE COUNTY.

Work is in progress on the Bone of Contention, near Williams. —— Schrimpf Bros., operating near Provolt, recently took out $400 worth of gold from a pocket in their mine.——The Baby (quartz), in Jump-off-Joe district, is bonded to Rice, Myers & Smith for one year for $1500. Work is in progress, the lower tunnel now being extended to cut the pay shoot at greater depth. The ledge runs from 1 to 3 feet in width.——Sharp Bros., owning the Challenge and Midnight (formerly the Kiessling) mines, on the Applegate river, near Provolt, are driving a 400-foot tunnel on the Midnight. Operations on the Challenge are temporarily suspended.——Operations are now being pushed on the Harmon Green (placer) at Galice; D. Green, Supt.

UMATILLA COUNTY.

Returns from a recent shipment of ore from the Yellow Jacket group, near Pendleton, show ore to run from $6 to $20 to the ton; Williams & Dugger, owners and operators.

The White Fox G. M. Co., capital $40,000, is incorporated at Pendleton.

SOUTH DAKOTA.

CUSTER COUNTY.

The shaft in the North Star, 9 miles northwest of Custer, now down 300 feet, will go to the 600-foot level. A 110-foot drift at this depth recently cut an 8-foot ledge of ore running $18 gold to the ton.

LAWRENCE COUNTY.

Two hundred and forty acres of land adjoining the Homestake at Lead are reported sold to A. M. Stevenson of Denver, Colo., G. M. Nix of Deadwood and others for $5,000,000. The new owners will erect stamp mills at a point 18 miles distant to treat ore from this property, which is said to run about $60 the ton. The estimated cost of treating, including freight at 30 cents per ton, is given as from 79 to 81½ cents per ton. A company will be organized under the laws of Colorado to work the properties.——The Spearfish M. Co., operating in Ragged Top district, 12 miles east of Lead, recently made the first clean-up at its 200-ton cyanide plant, returns giving 200 ounces gold. The latter was shipped to Colorado Springs, Colo. The cost of mining the ore is given as 50 cents per ton and the cost of treatment by the cyanide plant as $1 per ton. The company will probably enlarge the capacity of the plant to 500 tons this season.

PENNINGTON COUNTY.

The Joe Dollar, near Keystone, is reported sold to Chicago, Ill., and Deadwood men. The ore is said to run $100 to the ton. The new owners will put in a whim and two Tremain mills.

UTAH.

The output of the mines of the State for February is given as $2,292,450.

IRON COUNTY.

Another strike is reported made on the 160-foot level in the Johnny at Stateline. The ore is said to run $300 to the ton.——The Ophir M. Co., Manager Effinger, will soon begin work on its new 100-ton mill.

JUAB COUNTY.

The shaft on the Shoebridge Bonanza at Diamond, Tintic district, is down 575 feet. Crosscutting is under way on that level; Supt. Carruthers.——The Ridge & Valley M. Co. shaft at Tintic, now down 800 feet, will go to the 850-foot level, when a crosscut will be run.

PIUTE COUNTY.

H. Noyes has begun work on his properties near Marysvale.

SALT LAKE COUNTY.

The vein on the Jersey Blue, near Bingham, operated by the Bingham & Eastern M. Co., is opened at the 1380-foot mark in the tunnel. The company will build a concentrator.

During the first month's run the new smelter of the Bingham C. & G. M. Co. at Bingham treated 4200 tons of crude ore, from which 800 tons of high-grade copper, gold and silver matte were produced and shipped to Salt Lake.——During February the Highland Boy smelter at Bingham shipped thirteen carloads of copper, gold and silver bullion to Eastern refineries. Way bills show shipments to have been 781,950 pounds, valued at $195,487.50.——The West Mono M. Co., capital $10,000, is incorporated at Salt Lake.——The Highland Boy at Bingham is now shipping 500 tons of ore daily. The new smelter is running smoothly under Supt. White.

SUMMIT COUNTY.

The Valeo of Park City has contracted to ship 7000 tons of ore to the Bingham smelter.

TOOELE COUNTY.

The tunnel in the New Moon, in Skull valley, near Grantsville, is in 600 feet. The ore runs $12.20 gold to the ton.

UTAH COUNTY.

The old Mercur mill at Manning will handle the tailings at that mine. It has a capacity of 500 tons per day.

WEBER COUNTY.

The Carbonate Hill M. Co. will begin work on a new concentrator on its property near Ogden.

WASHINGTON.

FERRY COUNTY.

The Republic Con. M. Co. will put in a 10-drill air compressor, a 60 H. P. hoist and an 80 H. P. boiler on the Republic Consolidated, at Republic; hoist is a geared friction plant, with a capacity of 800 feet depth, and a speed of 500 feet per minute, and it will carry a two-ton load; machinery is expected to be in place within two months.

LINCOLN COUNTY.

The Pennsylvania, north of Davenport, now closed down, may resume operations shortly; the shaft on the property is down 75 feet.——B. L. Worts will run a 3000-foot tunnel on property northeast of the Pennsylvania.

OKANOGAN COUNTY.

Operations on the Nickle Plate, on Nickle Plate mountain, on Twenty-mile creek, near Hedley City, 70 miles north of Loomis, are being pushed by Supt. Rogers; forty men are employed, and air compressor is going in; mine has an elevation of 6650 feet.——It is stated that Wallaston & Bendell, owning the Horsefly, near Hedley City, will spend $20,000 in development, equipment, etc., on the property this summer.——The Princeton, Hedley City, is bonded to L. L. Patrick.

FOREIGN.

BRITISH COLUMBIA.

The first shipment of 250 tons of ore from the Rossland-Great Western, at

Rossland, since its purchase by the British America Corporation, was made on the 25th ult. to the smelter.——W. H. Sandiford of the Bosun M. Co., Ltd., operating the Bosun group of six claims near New Denver states that the tunnel on the sixth, or lower level, has cut the ledge; ore is silver-lead and averages $100 to the ton.

The report of Manager J. B. Hobson of the Con. Cariboo H. M. Co., Bullion, B. C., Cariboo district, shows that during 1900 the mine was operated 171½ days with from 2500 to 2750 miners' inches of water. The first run was from April 4 to July 1; 170,753 miners' inches washed out 791,899 cubic yards gravel, yielding 7867 ounces gold, valued at $134,728.45, an average yield of 17 cents per cubic yard, the duty of the water attained being 4.63 cubic yards gravel per miners' inch. The second run was from July 2 to Sept. 30, when 188,375 miners' inches washed out 751,000 cubic yards gravel and top clay, from which was recovered 9058 ounces gold, valued at $154,848.41, an average yield of 20.61 cents per cubic yard. The duty of the water attained during that run was 3.98 cubic yards gravel per miners' inch. The third run was from Oct. 1 to Nov. 9, when 101,750 miners' inches water caved and washed out 301,039 cubic yards top clay and gravel, recovering 3544½ ounces gold, valued at $60,508.91, an average yield of 20.1 cents per cubic yard. The duty of the water attained was 2.95 cubic yards per miners' inch. The receipts for 1900 were $353,146.07, the expenses $151,181.72. Manager Hobson figures that in 1901, "assuming that the clay capping will be successfully bank blasted and no accident occurs to interfere with the continuous operation of the mine, the operating expenses should not exceed about 6 cents per cubic yard of gravel washed."

At Silverton, a strike is reported made in the Hewitt in a crosscut from No. 3 tunnel at a point 50 feet from footwall of vein.——The Prescott, Silverton, is reported bonded; fifty men will be employed.——The Mission property, at Kamloops, is sold for $6000 for a smelter site. ——It is reported that the Iron Mask M. Co. has bought a smelter site near the head of Kamloops lake.——The tunnel on the Black Warrior group, Lardeau, now in 210 feet, will probably strike the ore chute at a point 70 feet farther in.——There are 800 tons of ore awaiting shipment at the Whitewater, Slocan.

The present capacity and increase proposed for the smelters of Yale and Kootenay is as follows:

	Present Capacity. Tons.	Proposed Increase. Tons.
Trail	800	1,500
Grand Forks	600	1,200
Nelson	300	300
Greenwood	300	1,000
Pyritic Smelter	250	250
Northport	1,200	1,800
Totals	3,450	6,050

The Rockland, about 4 miles south of Silverton, will be reopened.

Smelters at Greenwood and other towns in Kootenay are shutting down for lack of coal and coke. They have been getting both from the Crow's Nest Pass coal fields, but a shortage in both fields now exists in consequence of the passing of the control of the Crow's Nest coal mines to an American syndicate headed by James J. Hill. Hill's syndicate has paid $60 per share for a controlling interest in the Crow's Nest Coal Co. The management of the most important coal fields in western Canada thus passes from Canadian to American hands. A large part of the output will be used on the Great Northern lines in Montana and supplied smelters at Great Falls, Anaconda and as far south as Omaha.

MEXICO.

The Zapoteca M. Co., Ltd., is pushing work on its property at Zaveleta, 15 miles southwest of the city of Oaxaca, State of same name.——A 10-stamp mill will go in at San Miguel Peras, 30 miles from Oaxaca.——A 5-stamp mill is completed at the Montana mines, 5 miles north of Peras. ——Work is progressing on the San Francisco, in Taviche district, Oaxaca.——The Oaxaca M. & M. Co. of St. Louis, Mo., will put in a mill on its property in the same district.——Near Santa Catarina Minas work is in progress on the Natividad del Valle, in San Jose district.——The Conejo Colorado M. Co. of St. Louis, Mo., has bought thirty-four pertenencias in the Ocotlan district, Oaxaca, and will put in a mill, capacity twenty-five tons per day.

The Moctezuma Copper Co., operating at Nacosari, Sonora, operates its plant with eight 40 H. P. gas engines. The company has its own gas plant on the ground, using eight tons of coal daily for making gas.——The new mills of the Calumet & Hecla M. Co. of Boston, Mass., on the Fernando properties at Durango, Sonora, are running. They are operated by electricity and have a capacity of 150 tons daily.

On the La Calara group, at Wuensch, 35 miles from Magdalena, Sonora, 1000 feet of underground work will be done; a concentrating plant will be built; R. C. Bogy, of Denver, Colo., owner.

NEW ZEALAND.

A recent crushing of fifty-seven tons of ore at the Britannia, of the Britannia G. M. Co., near Westport, returned 123 ounces of gold.——Dredging operations are under way near Greymouth.——A recent week's run of the Waipuna dredger returned 14 ozs. gold.——The Leviathan dredger during same period returned 57 ozs. 12 dwts. of gold.

SOUTH AFRICA.

The new dredger for the Berim Gold Dredging Co., operating at Ashanti, is now on the way, it having been shipped recently from the Risdon Iron Works, San Francisco, Cal. The dredger weighs 100 tons. The machine was made in sections in order to be transported on muleback to the mines.

THE PHILIPPINES.

Reports from the gold mining district of northern Luzon are that a find of $2500 gold was recently made in a single pocket in Lepanto province, 175 miles north of Manila.

WESTERN AUSTRALIA.

The December output of Hannan's, Brown Hill, Kalgoorlie, was 6541 ounces, 9 dwts. of gold from 1666 tons of sulphide ore, and 313 oz. 6 dwts. gold from tailings, making a total of 6854 ozs. 15 dwts.

Personal.

J. R. DELAMAR is in San Francisco.

H. A. COHEN has gone East from Redding, Cal.

O. P. POSEY of Salt Lake, Utah, is in Boston, Mass.

JAMES W. ABBOTT of Lake City, Colo., is in San Francisco.

F. THOMPSON of Salt Lake, Utah, goes to Boulder county, Colo.

V. M. CLEMENT has returned to Salt Lake, Utah, from Mexico.

W. J. SOVERNS of Grants Pass, Or., has gone to Atlin, B. C.

C. R. LUNT, Supt. 16 to 1, Washington, Cal., is in San Francisco.

W. DAVIS of the Mexican, Douglas, Alaska, goes to Tacoma, Wash.

D. E. BIGELOW of San Francisco has returned from a business trip through Mexico.

MANAGER HERRON of the Tom Boy M. Co., Telluride, Colo., has gone to London, England.

W. W. GODSMARK is now president and manager Radcliffe Con. G. M. Co., Inyo county, Cal.

SECRETARY SMITH of Red Chief M. Co. has returned to Red Bluff, Mont., from Milwaukee, Wis.

W. E. HOWELL, formerly Supt. Pilgrim, near Forest City, Cal., has returned there from Mexico.

SUPT. BISHOP of the Silver Mountain M. Co., Empire, Colo., has returned there from Boston, Mass.

A. MOORE of Downieville, Cal., has gone to South America as Supt. for an Eastern mining company.

THOMAS G. HURLEY of New York City has been re-elected first vice-president Guanajuato Con. M. & M. Co.

H. C. BACORN, Supt. Golden Sunlight M. Co., Whitehall, Mont., has resigned to become manager American M. & Dev. Co.'s plants and properties, Gibbonsville, Idaho.

Recently Declared Mining Dividends.

	Payable.
Union Zinc & Lead M. Co., Kansas, 1%, $5000	March 1
Bunker Hill & Sullivan M. & C. Co., Idaho, $21,000	March 4
Elkton M. Co., Colorado, 3 cents per share, $75,000	March 20
Swansea M. Co., Utah, $5000	March 9
Commonwealth M. & M. Co., Colo., 850 shares Navajo G. M. Co. stock and 800 shares Challenge G. M. Co. stock, for each 1000 shares of Commonwealth stock	March 1
Gold Coin M. Co., Colo., 3 cents per share, $30,000	Feb. 28

Obituary.

M. M. LAUGHLIN, master mechanic in the Treadwell mines, Douglas Island, Alaska, while alighting from a skip, missed his footing and fell 400 feet to the bottom of the main shaft on the 27th ult.

Notices of Recent Patents.

Among the patents recently obtained through Dewey, Strong & Co.'s SCIENTIFIC PRESS U. S. and Foreign Patent Agency, the following are worthy of special mention:

ELECTRIC AMALGAMATOR.—No. 669,058. Feb. 26, 1901. L. H. Barricks, San Francisco, Cal.; one-half assigned to J. G. Tunnicliffe, same place.

This invention relates to electric amalgamators. It consists of electrolytic boxes having vertical porous partitions, forming compartments, one adapted to contain a saline solution and the other mercury, a sluice having an electrical conducting bottom dipping into the mercury compartment, a conductor within the first named compartment, journals and pins upon which the sluice is supported and means for adjusting the sluice at various inclines.

HAIR CURLERS.—No. 668,794. Feb. 26, 1901. Wm. Connolly, San Francisco, Cal.

This invention is for a device for curling hair. It consists of a tube or sleeve, a holder adapted to slip therein, means for locking the two together, an independent handle slidable upon the projecting end to receive the end of the sleeve and locking device. Means are provided for heating the tube before the parts are secured together.

FLUSHING TANK.—No. 668,709. Feb. 26, 1901. I. P. Clarke, Alameda, Cal.

This invention is designed to produce a noiselessly operating flushing tank for closets and the like. It comprises a means for filling the tank and automatically cutting off the water supply, a discharge pipe and controlling valve having a lever connection, a hinge seat, a spring plate extending transversely across its back with free ends and normally bent downward. Arms are fixed to and project rearwardly from the seat and engage the free ends of the spring to open the water supply and close the discharge valve when the seat is occupied, the spring acting to raise the seat, cut off the water and open the discharge valve when the seat is vacated.

WATER WHEEL REGULATING DEVICE.—No, 668,801. Feb. 26, 1901. Newton Lamb, Yreka, Cal.

This invention relates to water wheels and governors, and comprises a plurality of nozzles through which water is directed against peripheral projections upon the wheel to propel the latter, a reverse nozzle through which water may be directed to retard the wheel, means for supplying water to these nozzles and valves and means for operating the valves of the various nozzles so that water is simultaneously cut off from the forward driving nozzle and supplied to the reverse or compensating nozzle to vary or check the speed of the wheel.

List of U. S. Patents for Pacific Coast Inventors.

REPORTED BY DEWEY, STRONG & CO., PIONEER PATENT SOLICITORS FOR PACIFIC COAST.

FOR THE WEEK ENDING FEB. 26, 1901.

669,058.—ELECTRIC AMALGAMATOR — L. H. Barricks, S. F.
668,705.—SHIPPING WRAPPER—H. Baskerville, St. Helena, Cal.
668,769.—AUTOMOBILE — J. Break, Spokane, Wash.
668,971.—ELEVATOR—E. Brown, Colfax, Wash.
668,952.—DESULPHURIZER—G. C. Carson, Castella, Cal.
668,980.—CONCENTRATOR—C. A. Christensen, Oretown, Or.
668,709.—FLUSHING TANK—I. P. Clarke, Alameda, Cal.
668,794.—HAIR CURLER—W. Connolly, S. F.
669,029.—BUILDING BLOCK—E. A. Faller, S. F.
668,987.—ELEVATORS — D. B. Fleck, Portland, Or.
669,008.—LATCH—R. Franken, Los Angeles, Cal.
668,775.—FLOWER HOLDER—J. Herfert, Tucker, Wash.
668,854.—FISH TRAP—S. J. Knight, Fairhaven, Wash.
668,801.—WATER WHEELS — N. Lamb, Yreka, Cal.
668,994.—VEHICLE TIRE—J. B. & A. A. Mahana, Toledo, Wash.
668,929.—TREATING EAR DISEASES — M. Polich, Riverside, Cal.
668,776.—PLUMBER'S TRAP — E. Riley, Spokane, Wash.
668,804.—TEMPORARY BINDER — C. K. Rosenberg, S. F.
668,724.—CORD CUTTER—S. H. Wiessedeppe, Olympia, Wash.

Latest Market Reports.

SAN FRANCISCO, March 7, 1901.

SILVER—Per oz., Troy: London, 28 5/8d (standard ounce, 925 fine); New York, bar silver, 61⅛c (1000 fine); San Francisco, 61⅛c; Mexican dollars, 50c.

COPPER.—New York: Lake, 1 to 3 casks, $17; carload lots, $16.75; Electrolytic, 1 to 3 casks, $16.60; carload lots, $16.50; Casting, 1 to 3 casks, $16.50; carload lots, 16.35. San Francisco: 18. Mill copper plates, 20c; bars, 22@23c.

LEAD.—New York, $4.37½; Salt Lake City, $4.00; St. Louis, $4.20; San Francisco $5.00, carload lots; 5½c 1000 to 4000 lbs.; pipe 6¾, sheet 7½, bar 6c; pig, $4.70 @5.10. London, £14 7s 6d per ton= 3.125 cts. per lb.

SPELTER. — New York, $4.20; St. Louis, $3.75; London, £17 7s 6d per ton =3.77½ cts. per lb; San Francisco, ton lots, 5½c; 100-lb lots, 6c.

ANTIMONY.—New York, Cookson's, 10c; Hallett's, 9⅛c; San Francisco, 1000-lb lots, 12c; 300 to 500 lbs., 13@14c; 100-lb lots, 15@18c.

IRON.—Pittsburg, Bessemer pig, $14.75; gray forge, $14.25; San Francisco, bar, per lb., 2.65c in small quantities.

STEEL.—Bessemer billets, Pittsburg, $20.75; open hearth billets, $21.75; San Francisco, bar, 7c to 12c per lb.

TIN.—New York, pig, $26.75; San Francisco, ton lots, 29c; 1000 lbs., 29½c; 500 lbs., 29½c; less, 30c; bar tin, ₱ lb, 35c.

QUICKSILVER. — New York, $51.00 large lots; London, £9 2s 6d; San Francisco, local, $48.00 ₱ flask of 76½ lbs.; Export, $45.00

MAGNESIUM.—New York, $2.90 ₱ lb.; San Francisco, $3.75.

ZINC.—San Francisco, 5½c; slab, 5¾c; bar, 7c; zinc dust, N. Y., 8c.

BABBITT METAL.— San Francisco, No. 1, 10c.

SOLDER. — Half-and-half, 100-lb. lots, 18½c; San Francisco, Plumbers', 100-lb. lots, 15½c.

ASSAY LITHARGE.—San Francisco, 10c ₱ lb, small lots.

BISMUTH.—New York, ₱ lb., $2.25 50-lb lots; San Francisco, $2.50 to $2.75 lb lots.

PLATINUM.—San Francisco, crude, $17 ₱ oz.; New York, $18.20 per Troy oz

ALUMINUM.—New York, No. 1, 99% pure ingots, 35c; No. 2, 90%, 30c to 35c.

FERRO-MANGANESE. — Pittsburg, 80%, domestic, $62.50, large lots.

TUNGSTEN.—New York, ₱ lb., 95c; San Francisco, $1.15.

FERRO-TUNGSTEN. — New York, 37%, 32c; San Francisco, 65c (60%).

NICKEL.—New York, 50@60c ₱ lb.

PHOSPHORUS.—F. o. b. New York 50@60c ₱ lb.

POWDER.—F. o. b. San Francisco: No. 1. 70% nitro-glycerine, per lb., in carload lots, 15½c; less than one ton, 17½c. No. 1*, 60%, carload lots, 13½c; less than one ton, 15½c. No. 1** 50%, carload lots, 11¾c; less than one ton, 13¾c. No. 2, 40%, carload lots, 10c; less than one ton, 12c. No. 2* 35%, carload lots, 9½c; less than one ton, 11½c. No. 2** 30% carload lots, 9c; less than one ton, 11c. Black blasting powder in carload lots, minimum car 728 kegs, $1.50 per keg; less car lots, $2 per keg.

CAPS.—3x, $5.50 per 1000; 4x, $6.50; 5x, $8; Lion, $9, in lots not less than 1000.

FUSE.—Triple tape, $3.60 per 1000 feet; double tape, $3.00; single tape, $2.65; Hemp, $2.10; Cement No. 2, $3.00; Cement No. 1, $2.65, in lots of 3000 feet and up.

CANDLES.—Granite 6s, 16 oz., 40s., 11½c ₱ set; 14 oz., 40s., 10c.

CHEMICALS.—Cyanide of potassium, 98%–99%, jobbing, 32½@33½c ₱ lb.; carloads, 30@31c; in 10-lb. tins, 40c; sulphuric acid, in carboys, 66% B, 2c ₱ lb.; soda ash, $1.90 ₱ 100 lbs. 58%; hyposulphite of soda, 2¾@3c ₱ lb.; blue vitriol, 5¾@6½c ₱ lb.; borax, concentrated, 7@8c ₱ lb.; chlorate of potash, 12@13c; roll sulphur, 6c; alum, $1.90@2.00; flour sulphur, French, 2½@ 2¾c; California refined, 1¾ @ 2c; nitric acid, in carboys, 8c ₱ lb.; caustic soda, in drums, 3@4c ₱ lb.; Cal. s. soda, bbls., $1.00; sks, 95c ₱ 100 lbs.; chloride of lime, spot, $2.50@2.60; nitrate of potash, in kegs, 8c; caustic potash, 10c in 40-lb. tins.

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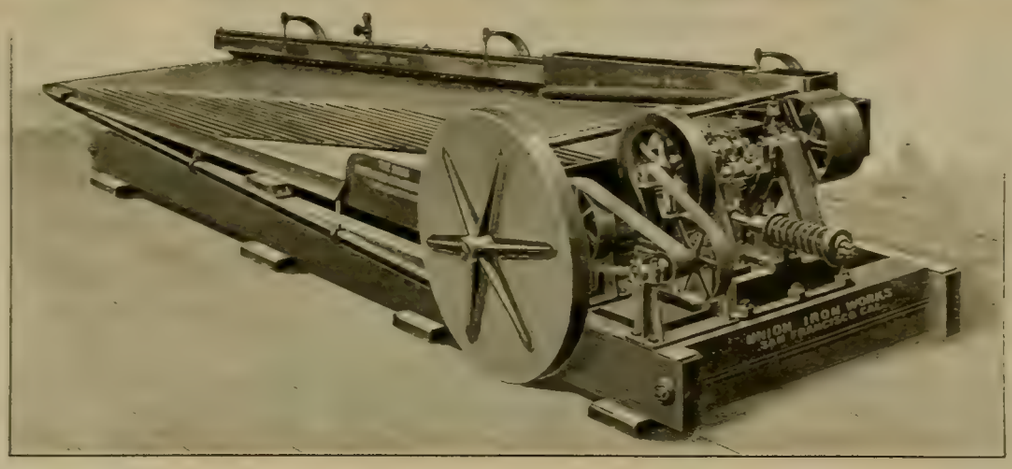

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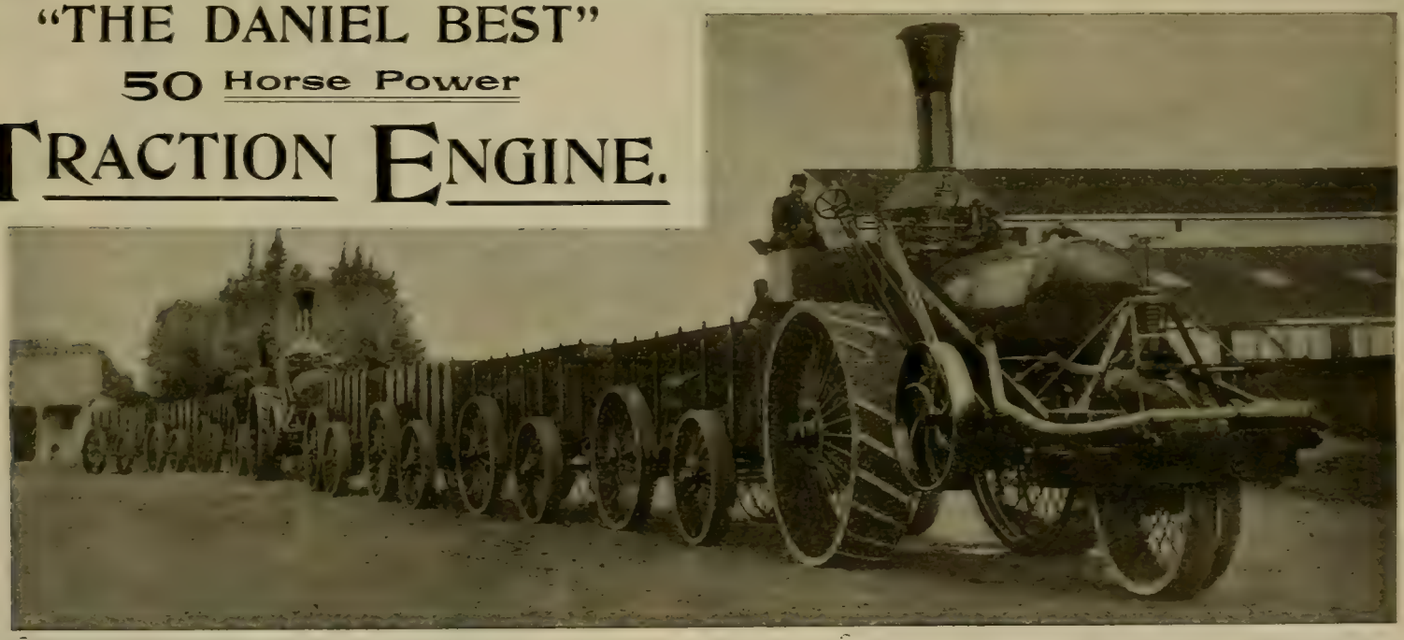

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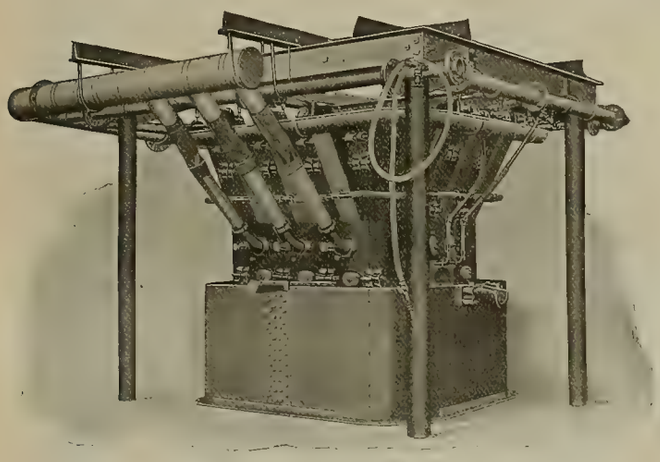

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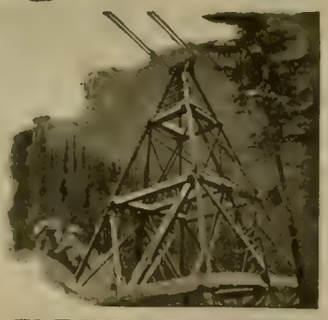

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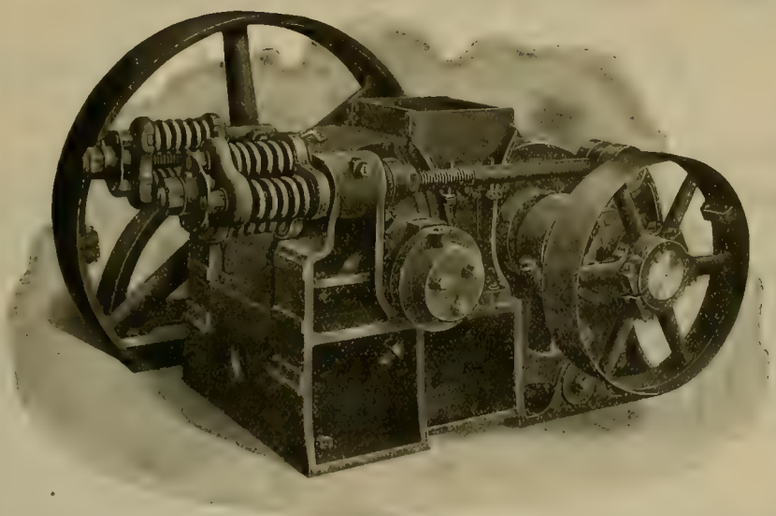

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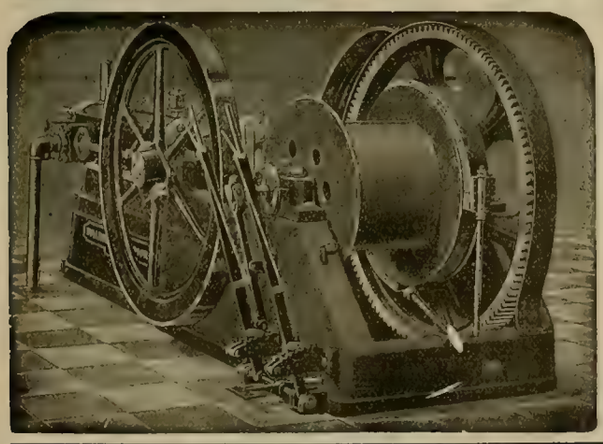

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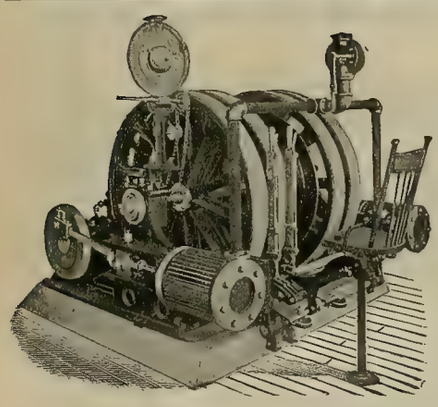

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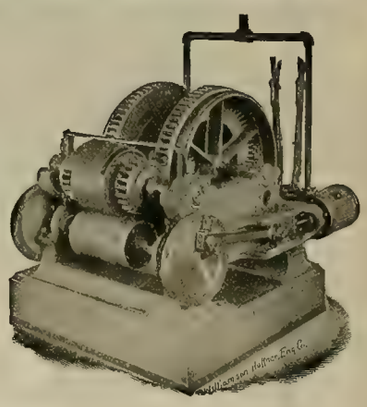

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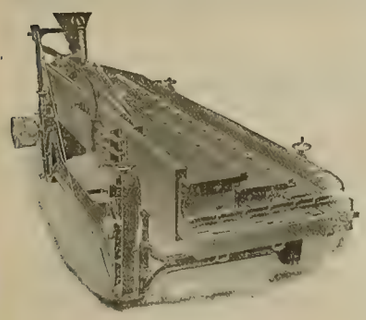

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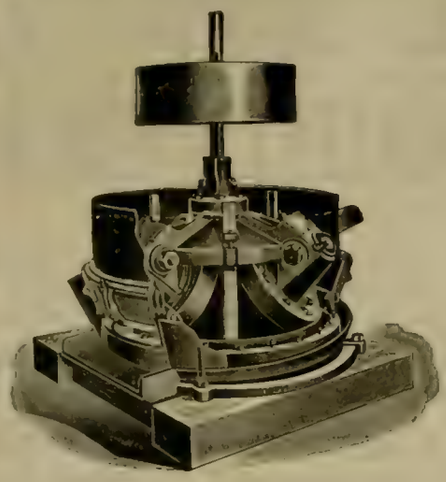

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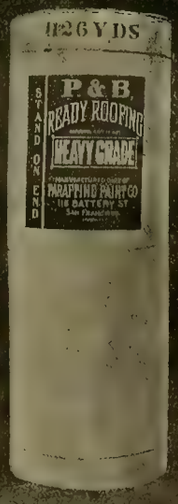

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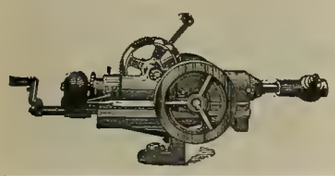

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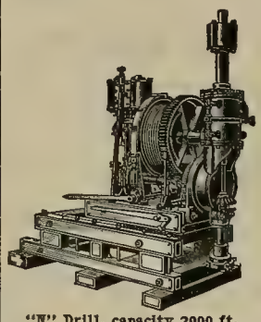

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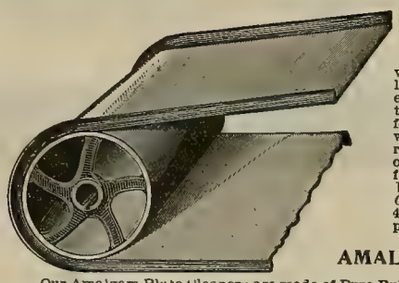

This illustration shows the edge flanging outwardly as it passes over the pulley. This relieves the strain from the top and bottom of the edge by directing the strain automatically to the inside face surface of the edges. Heretofore all belts have been so constructed that when they pass over the pulleys or rolls, a direct strain comes upon the top or at the base of of the edges, causing the edges to break away from the body of the belts in a very short time. *We avoid this Mechanical Defect by our Spadone Curved Edge.* Belts made to fit any machine—4, 5 and 6 feet wide. Prices and samples on application.

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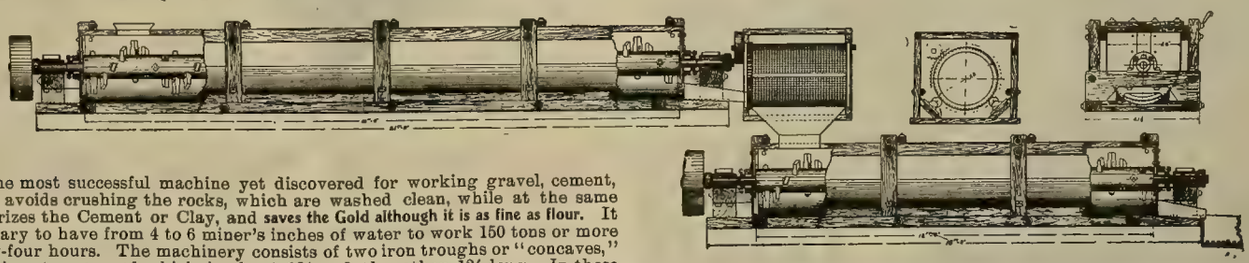

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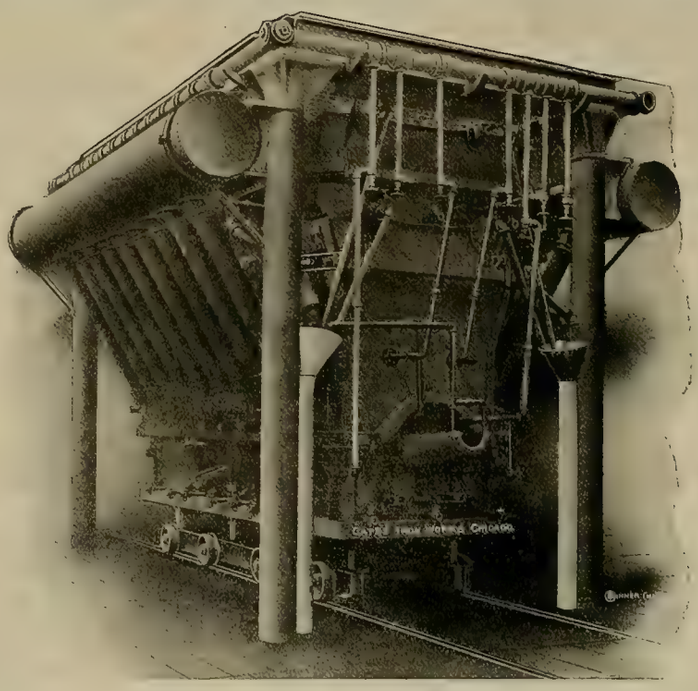

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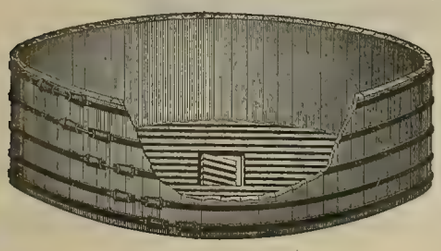

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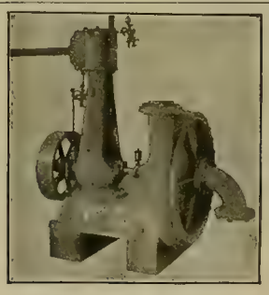

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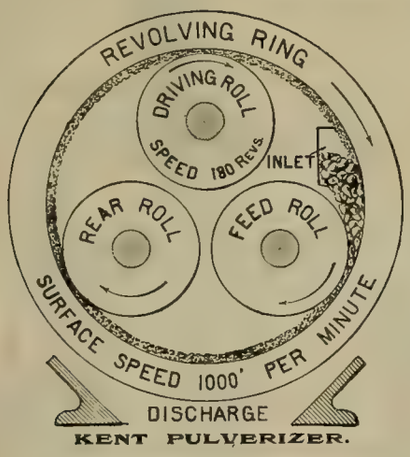

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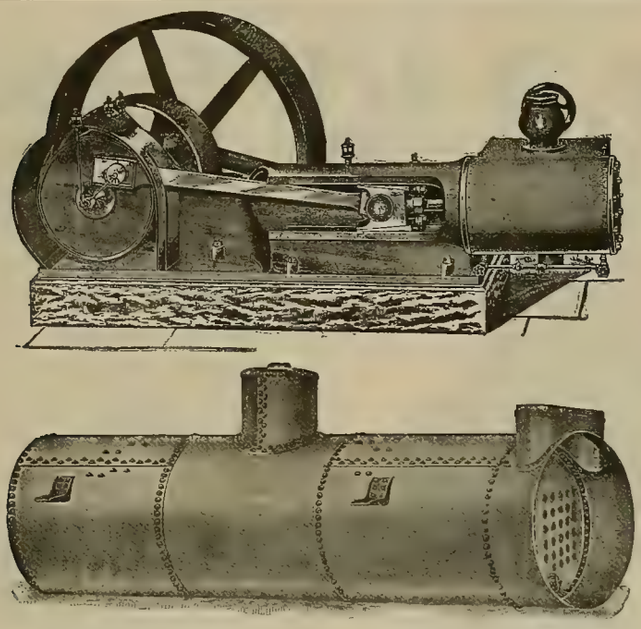

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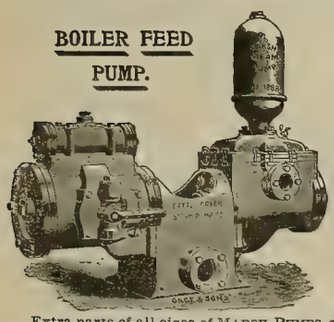

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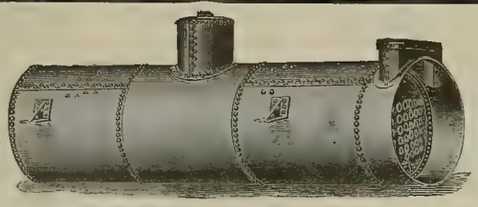

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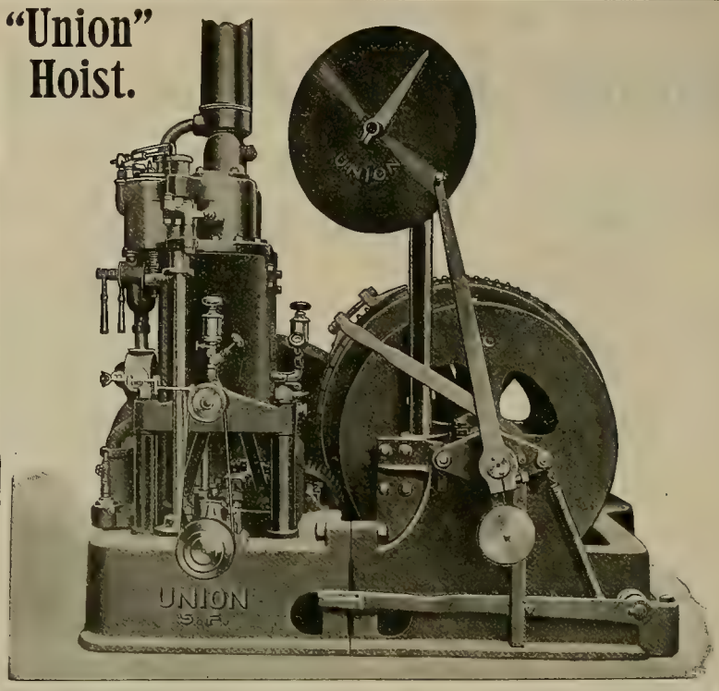

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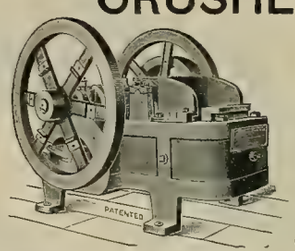

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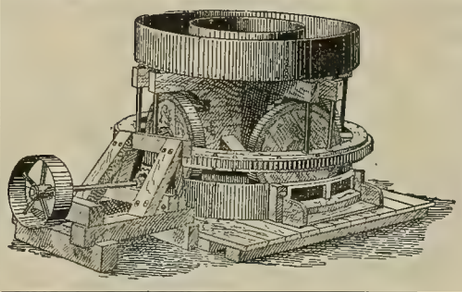

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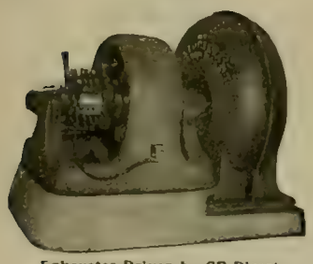

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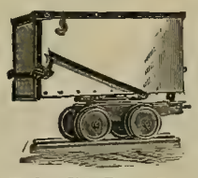

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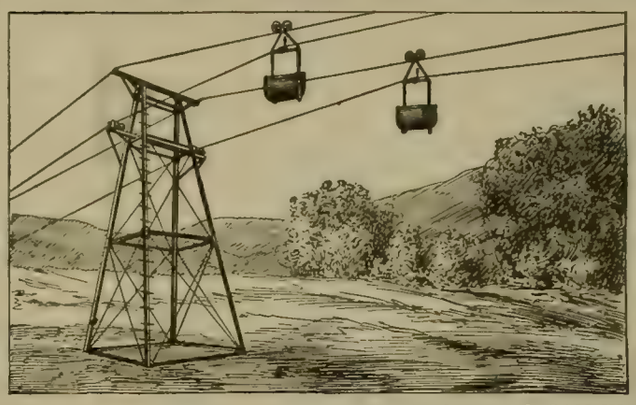

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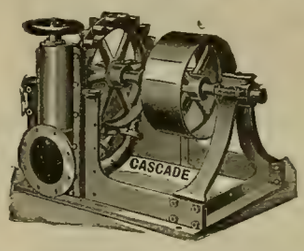

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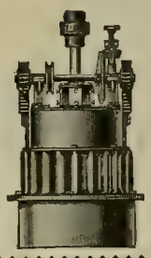

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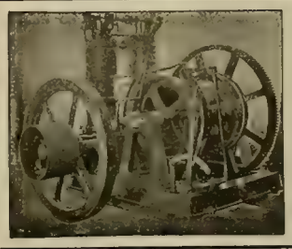

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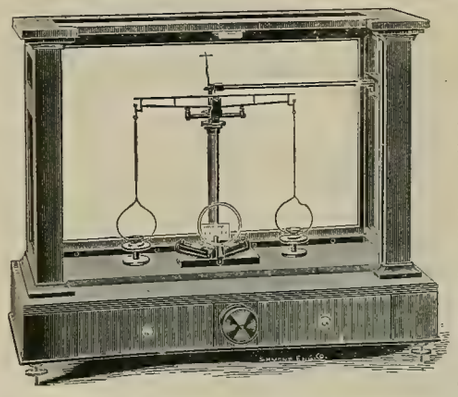

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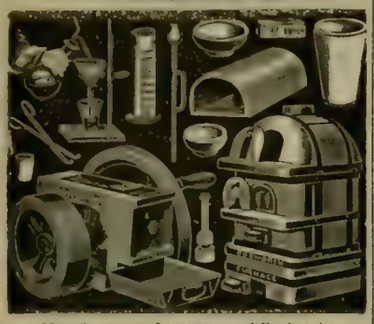

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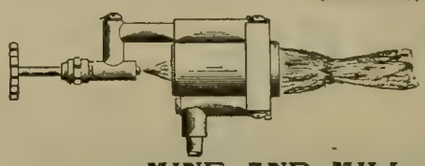

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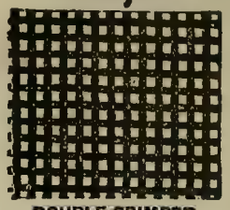

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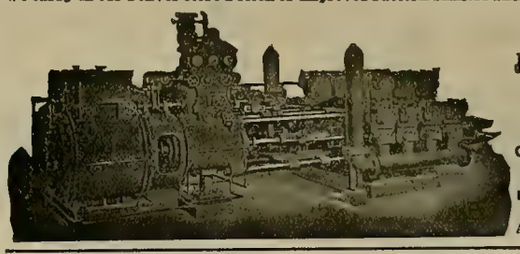

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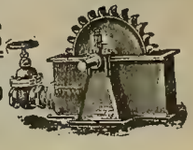

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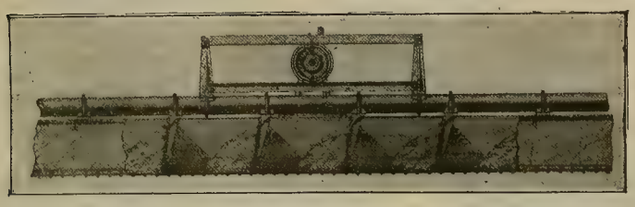

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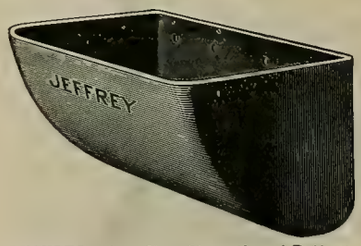

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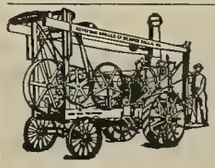

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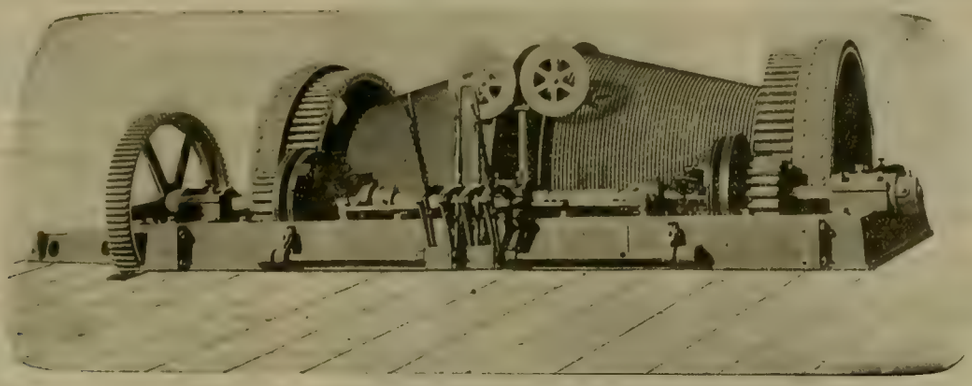

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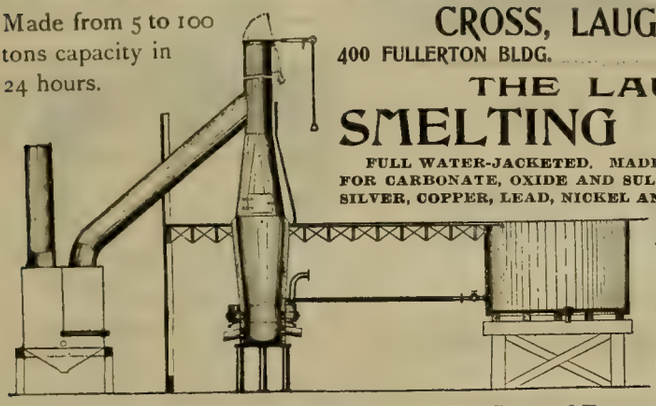

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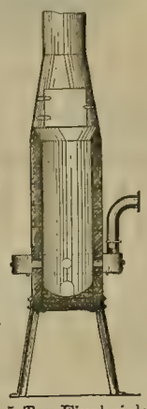

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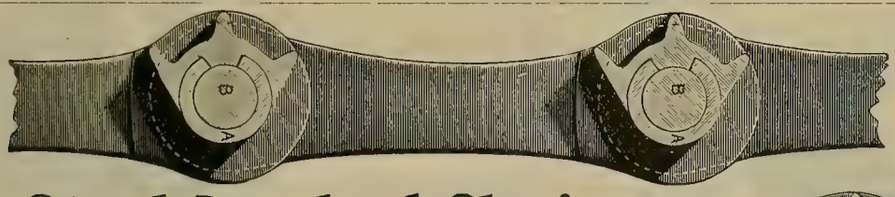

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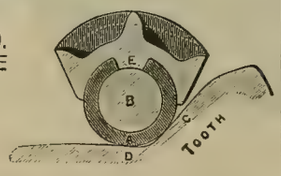

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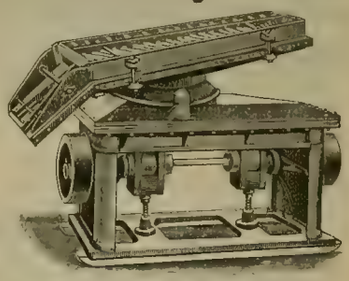

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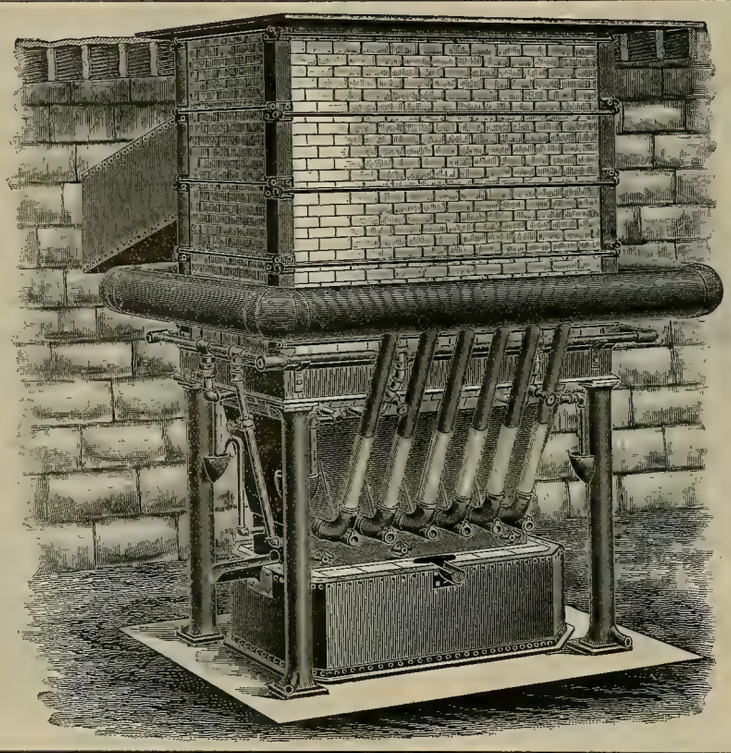

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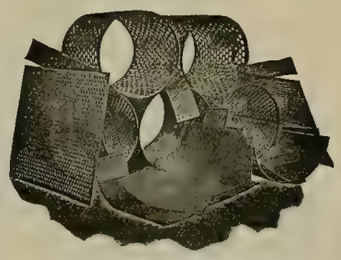

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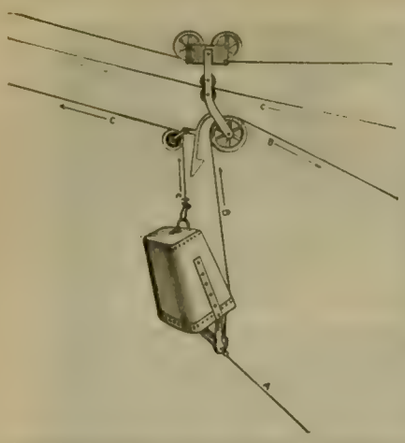

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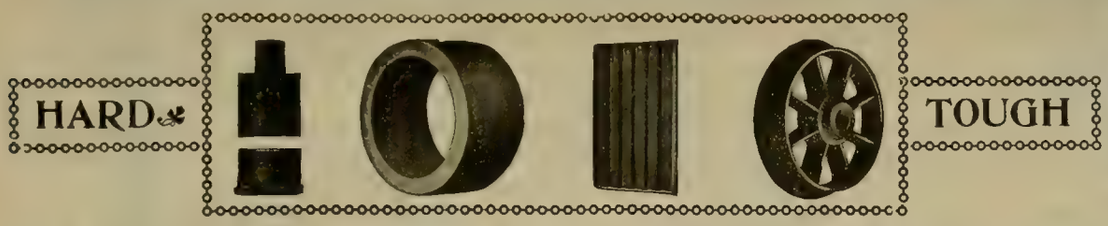

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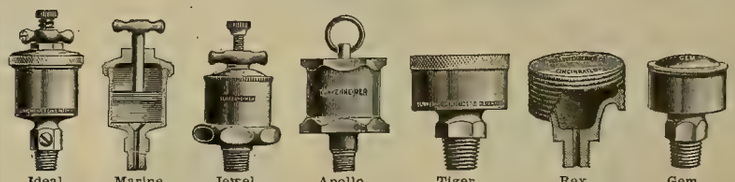

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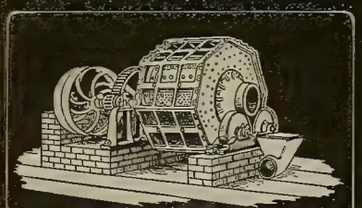

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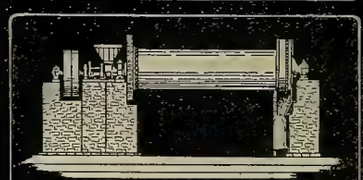

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225

ASSESSMENT NOTICES.

ALLIANCE EXPLORATION & MINING COMPANY.—Location of principal place of business, San Francisco, California; location of works, Ophir, Placer County, California.

Notice is hereby given, that at a meeting of the Board of Directors, held on the 12th day of February, 1901, an assessment (No. 3) of two (2) cents cents per share was levied upon the capital stock of the corporation, payable immediately in United States gold coin, to the secretary, at the office of the company, 236 Sutter street, San Francisco, California.

Any stock upon which this assessment shall remain unpaid on the 18th day of March, 1901, will be delinquent, and advertised for sale at public auction; and unless payment is made before, will be sold on MONDAY, the 8th day of April, 1901, to pay the delinquent assessment, together with the costs of advertising and expenses of sale.

By order of the Board of Directors.

S. GOLDSMITH, Secretary.

Office—236 Sutter street, San Francisco, California.

MARIPOSA COMMERCIAL AND MINING COMPANY.—Location of principal place of business, San Francisco, California; location of works, Mariposa County, California.

Notice is hereby given, that at a meeting of the Board of Directors, held on the 23d day of February, 1901, an assessment (No. 21) of Ten ($10) Dollars per share was levied upon the capital stock of the corporation, payable immediately in United States gold coin, to the secretary, at the office of the company, 320 Sansome street, room 24, San Francisco, California.

Any stock upon which this assessment shall remain unpaid on the 11th day of April, 1901, will be delinquent, and advertised for sale at public auction; and unless payment is made before, will be sold on SATURDAY, the 4th day of May, 1901, to pay the delinquent assessment, together with the costs of advertising and expenses of sale.

By order of the Board of Directors.

JOSEPH H. MOOSER, Secretary.

Office—320 Sansome street, room 24, San Francisco, California.

SPANISH CONS. QUARTZ MINING COMPANY.—Location of principal place of business, San Francisco, California; location of works, Nevada County, California.

Notice is hereby given, that at a meeting of the Board of Directors, held on the 12th day of February, 1901 an assessment (No. 4) of five (5) cents per share was levied upon the capital stock of the corporation, payable immediately in United States gold coin, to the secretary, at the office of the company, 113 Crocker Building, San Francisco, California.

Any stock upon which this assessment shall remain unpaid on the 19th day of March, 1901, will be delinquent, and advertised for sale at public auction; and unless payment is made before, will be sold on MONDAY, the 8th day of April, 1901, to pay the delinquent assessment, together with costs of advertising and expenses of sale.

By order of the Board of Directors.

B. N. SHOECRAFT, Secretary.

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DELINQUENT SALE NOTICE.

AMERICAN OIL AND REFINERY COMPANY.—Location of principal place of business, San Francisco, California. Location of works, Contra Costa County, California.

NOTICE.—There are delinquent upon the following described stock, on account of assessment (No. 2) levied on the 26th day of November, 1900, the several amounts set opposite the names of the respective shareholders, as follows:

Names.	No. Cert.	No. Shares.	Amt.
Abbott, William	720	50	$2 50
Abbott, William	721	50	2 50
Abbott, William	722	50	2 50
Abbott, William	723	25	1 25
Abbott, William	734	25	1 25
Anthony, J. C., Trustee	797	1,000	50 00
Anthony, J. C., Trustee	798	1,000	50 00
Anthony, J. C., Trustee	799	1,000	50 00
Anthony, J. C., Trustee	973	1,000	50 00
Anthony, J. C., Trustee	1021	4 300	215 00
Dignau, J. P.	1039	1,000	50 00
French, Mrs. Mary L.	835	2	10
Goodenough, S.	1046	380	19 00
Holbrook, W. E., Trustee	897	10 000	500 00
Holbrook, W. E., Trustee	898	11,000	550 00
Holbrook, W. E., Trustee	899	4 500	225 00
Holbrook, W. E., Trustee	900	4,500	225 00
Kielhofer, Mrs. Louis	298	2	10
Kraehmer, Louis L.	471	3	15
Laird, Mrs. L. N.	230	5	25
Lord, Mrs. Leona E.	327	2,000	100 00
Lucas, Mrs T. R.	848	10	50
Mayer, Mrs. L.	406	800	40 00
Massey, James B.	914	1	05
McKelvey, Mrs Angelina	71	12	60
McAllister, H. L.	1071	100	5 00
Pope, Wm.	656	50	2 50
Pope, Wm.	695	20	1 00
Pope, Wm.	764	30	1 50
Pope, Wm	908	20	1 00
Raht, Julia F.	321	25	1 25
Raht, Julia F.	453	40	2 00
Rachel, Mrs. Eliza	856	400	20 00
Royce, Lizzie A.	441	5	25
Russell, G. E.	125	3	15
Stover, W. M.	1047	480	24 00
Truitt, J. J.	399	5	25
Walser, Mark	858	1,000	50 00
Walser, Mark	859	1,000	50 00
Walser, Mark	860	1,000	50 00
Walser, Mark	861	1,000	50 00
Walser, Mark	863	500	25 00
Walser, Mark	867	500	25 00
Walser, Mark	868	500	25 00
Walser, Mark	869	500	25 00
Walser, Mark	870	500	25 00
Walser, Mark	871	500	25 00
Walser, Mark	872	500	25 00
Walser, Mark	921	50	2 50
Walser, Mark	926	5,000	250 00
Walser, Mark	927	5,000	250 00
Walser, Mark, Trustee	596	500	25 00
Walker, Mrs. S. E. D. E.	375	120	6 00
Young, R.	761	328	16 40

And in accordance with law, and an order from the Board of Directors, made on the 26th day of November, 1900, so many shares of each parcel of such stock as may be necessary, will be sold at public auction at the office of said corporation, in Rooms 322-323 Parrott building, San Francisco, California, on MONDAY, the 28th day of January, 1901, at the hour of 1 o'clock P. M. of said day, to pay said delinquent assessment thereon, together with costs of advertising and expenses of sale.

J. C. ANTHONY, Secretary.

Office—Rooms 322-323, Parrott building, San Francisco, California.

POSTPONEMENT.

By order of the Board of Directors, the day of sale of the above delinquent stock has been postponed to MONDAY, the 11th day of February, 1901, at the hour of 1 o'clock P. M., at the office of said corporation in Rooms 322-323 Parrott building, San Francisco, California. J. C. ANTHONY, Secretary.

POSTPONEMENT.

By order of the Board of Directors, the day of sale of the above delinquent stock has been postponed to MONDAY, the 25th day of February, 1901, at the hour of 1 o'clock P. M., at the office of said corporation in Rooms 322-323 Parrott building, San Francisco, California. J. C. ANTHONY, Secretary.

POSTPONEMENT.

By order of the Board of Directors, the day of sale of the above delinquent stock has been postponed to MONDAY, the 11th day of March, 1901, at the hour of 1 o'clock P. M., at the office of said corporation in Rooms 322-323 Parrott building, San Francisco, California. J. C. ANTHONY, Secretary.

ANNUAL MEETING.

The Regular Annual Meeting of the Stockholders of the SPANISH CONS QUARTZ MINING COMPANY will be held at the office of the Company, 113 114 Crocker Building, San Francisco, California, on WEDNESDAY, the 13th day of March, 1901, at the hour of 2 o'clock P. M., for the purpose of electing a Board of Directors to serve for the ensuing year, and the transaction of such other business as may come before the Meeting.

Transfer Books will close on SATURDAY, March 2, 1901, at 12 o'clock noon.

B. N. SHOECRAFT, Secretary.

Office—113-114 Crocker Building, San Francisco, California.

DELINQUENT SALE NOTICE

YUBA RIVER GOLD DREDGING COMPANY.—Location of principal place of business, San Francisco, California; location of works, Smartsville, Yuba County, California.

Notice.—There are delinquent upon the following described stock, on account of assessment (No. 2) levied on the 4th day of January, 1901, the several amounts set opposite the names of the respective shareholders, as follows:

Names.	No. Cert.	No. Shares.	Amt.
Henry Hilp	4	5	$0 15
Albert Moch	8	2,000	60 00
A. W. Goldsmith	9	2,000	60 00
H. L. Frank	14	1,000	30 00
H. L. Frank	15	1,000	30 00
H. L. Frank	16	1,000	30 00
H. L. Frank	17	1 000	30 00
H. L. Frank	18	1,000	30 00
H. L. Frank	19	1,000	30 00
H. L. Frank	20	1,000	30 00
H. L. Frank	21	1,000	30 00
H. L. Frank	22	1 000	30 00
Henry Hilp	28	500	15 00
M. E. Mayer	32	500	15 00
Hannah Heringhi, Trustee	33	300	9 00
S. Belasco, Trustee	34	200	6 00
Ed. Belasco, Trustee	35	200	6 00
Sarah Mayer, Trustee	36	200	6 00
I. Belasco	37	250	7 50
S. Belasco	38	100	3 00
Rose Haas	39	200	6 00
E Heringhi, Trustee	40	200	6 00
Mark Thall	41	200	6 00
Louis Heringhi	42	100	3 00
Martin Freund	49	500	15 00
G. A Kornberg	66	10,000	300 00
G. A. Kornberg	67	10,000	300 00
G. A. Kornberg	68	10,000	300 00
G. A. Kornberg	72	1,000	30 00
G. A. Kornberg	73	1,000	30 00

And in accordance with law, and an order from the Board of Directors, made on the 4th day of January, 1901, so many shares of each parcel of such stock as may be necessary, will be sold at public auction at the office of the company, Room 31, No. 214 Pine street, San Francisco, California, on TUESDAY, the 5th day of March 1901, at the hour of 2 o'clock P. M. of said day, to pay said delinquent assessment thereon, together with costs of advertising and expenses of sale.

ALBERT CERF, Secretary.

Office—No. 214 Pine street, Room 31, San Francisco, California.

POSTPONEMENT.

By order of the Board of Directors the day of sale of the above delinquent stock has been postponed to THURSDAY, April 4th, 1901, at the same hour and place. ALBERT CERF, Secretary.

Office—No. 214 Pine street, Room 29, San Francisco, California.

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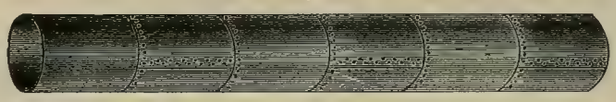

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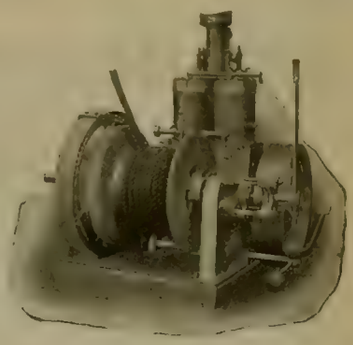

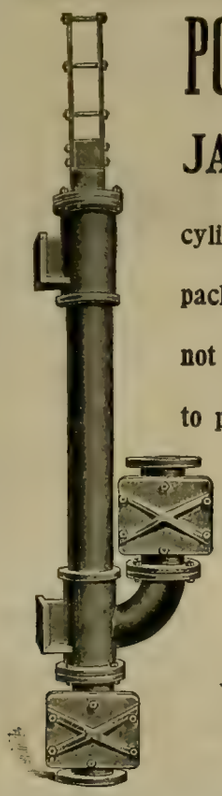

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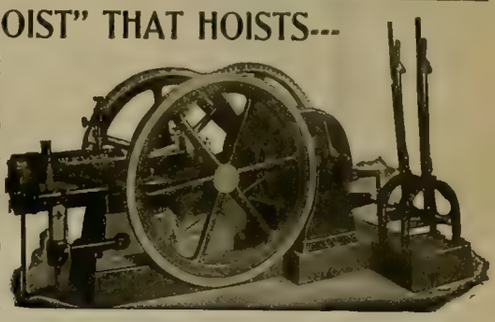

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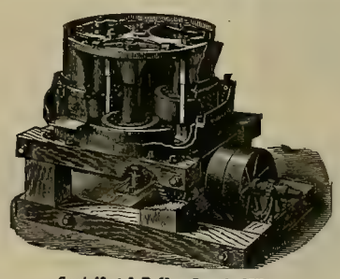

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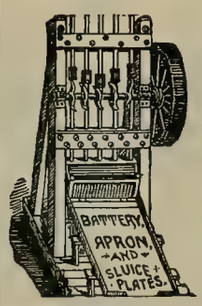

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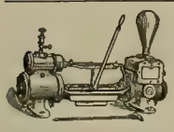

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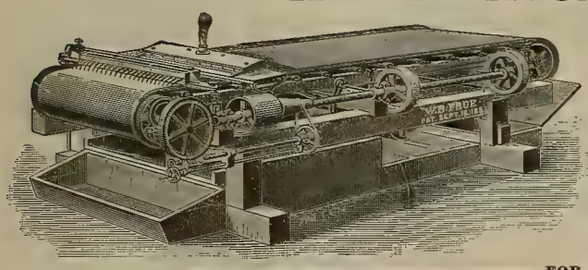

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The results obtained by this machine are the "acme" of concentration, and several cheap and untried machines that have lately come on the market compare by it. The manufacturers will tell you that they are "just as good, and cheaper," etc. The facts are that no other concentrator made has an equal capacity, or will yield as clean a concentrate with as small loss in the tailings as the Frue Vanner. The amount saved from the lower first cost of an inferior machine counts little in the year's results, when compared with the increased output from a Frue. This machine not only gives better results at both ends of the belt (i. e., clean product and poor tailings), but is operated at less expense and requires less attention than any other machine on the market. At the Alaska-Treadwell mine, where they have ordered over 350 Frue Vanners, one man attends 48 machines for 12-hour shift.

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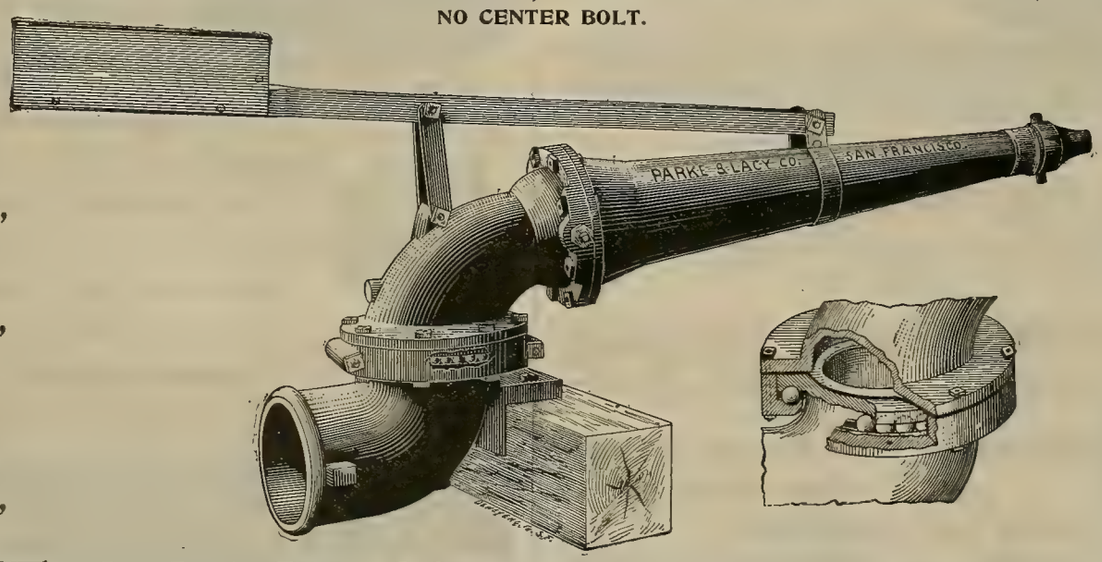

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MINING AND SCIENTIFIC PRESS.

Whole No. 2121.—VOLUME LXXXII. Number 11. SAN FRANCISCO, SATURDAY, MARCH 16, 1901. THREE DOLLARS PER ANNUM. Single Copies, Ten Cents.

Copper Queen Mine, Arizona.

Thirty miles south of Tombstone, 56 miles southeasterly from Benson, is Bisbee, Ariz., within 7 miles of the Mexican border; this Cochise county copper property, with its shafts, smelting and reduction works, is the leading property of that section, the converters turning out a copper bullion ore 99% pure copper. For several years nearly 1000 men have found employment from the Copper Queen Co., and at times copper has been produced at the rate of 2,000,000 pounds per month.

Congress, Arizona, Mine and Mill.

About midway between Prescott and Phœnix, Arizona, on the south side of the Date mountains, overlooking the valley of the Hassayampa, is the famous Congress property, 4 miles from the main line of the Santa Fe, Prescott & Phœnix Railway, the latter distance covered by a railroad from Congress Junction. Much has been written about the mine, and full details of all its workings have appeared herein. The ore is remarkable in the vein, showing no break to the 1700-foot level. It carries no free gold, but mills about $20 in gold per ton. A new 40-stamp mill, 1000 pounds each, drop 100 to the minute, will soon be in operation. The anvil blocks under battery weigh seven tons each set in concrete, latter upon stone blocks. There are no amalgamating plates, the process being concentration and cyaniding.

Copper Queen Property, Bisbee, Arizona.

Smelter of the Verde Queen Copper Co., Jerome, Arizona. (See Page 136.)

Prospectors' Smelting Furnace.

"Prospectors' smelting furnaces" are sometimes advertised, with results to investors therein sometimes more interesting than satisfactory. Our editorial Arizona correspondent, while recently visiting Jerome, found a primitive affair of that nature made and used by Harold Boedtker, assayer and chemist with the Verde Queen Copper Co., which, while not a very stylish contrivance, answers all practical purposes, and is a convenient little device. He had a photograph taken of it in "full operation," from which the engraving on this page was made.

Congress, Arizona, Mines and Mills.

Improvised Prospectors' Smelting Furnace, Made of Pipe, Bars of Iron and Stone, by Harold Boedtker, Jerome, Arizona.

MINING AND SCIENTIFIC PRESS.

ESTABLISHED 1860.

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San Francisco, March 16, 1901.

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THE advance in size and extent of electrical enterprises that have characterized California electrical transmission schemes since 1896 merely serve as an index to even more ambitious enterprises of similar nature. The Bay Counties Power Co. is now putting into practical shape a plan to transmit 50,000 volts 140 miles, and supply light and power to the half-million residents on the bay of San Francisco.

ON pages 141-142 appears graphic portrayal of two giant locomotives—the largest on the continent—and employed, as most large machines are, in mining enterprises. The two pictured on pages 141-142 are fairly representative of the great East and the greater West—the latter always wanting something a little better, larger, more powerful and valuable than anything in any line previously produced, such demand being constantly commensurate with existing requirements.

THE mineral wealth of the territory of Arizona continues to attract deserved attention, and its development is inducing skilled labor and capital. The territory shares in the general prosperity and is making a showing that entitles it to consideration as a State. Increased freight facilities, improved mining methods and decreased cost of supplies are helping there as elsewhere. Twenty years ago it cost more to pay the freight charges on the goods brought into the mines than the supplies now cost delivered at Arizona mines.

PROF. N. S. SHALER prophesies that within thirty years the world will be suffering from a glut of gold. When such an experienced man as he says anything, it is worth listening to; but, in this case, the element of probability is lacking in the assertion. While it is manifest that modern methods make easier the production of gold, yet it is equally manifest that in the very nature of things it is impossible that gold or silver can be profitably produced except by the investment of considerable money and skill. The mistake of Mr. Shaler is in assuming that the mining of gold and silver is in every way analogous to mining coal or iron. In the case of the precious metals there have always been and will always be natural restrictions and difficulties of production that will make impossible the "glut" that has been so repeatedly predicted. Financially, the fact is to be noted that the increase in the world's production of gold keeps exact pace with the demand for money.

Leaching Copper Ores by Sulphurous Acid.

The above is the title of a paper read by E. P. Jennings of Salt Lake City, Utah, at last week's session of the Canadian Mining Institute. The widespread inquiry regarding this general subject of leaching of copper ores justifies notice of the process which has been patented in the United States by J. W. Neill, of Salt Lake City, Utah. It is stated to be more especially designed for treatment of deposits of copper ore remote from transportation, fuel and fluxes.

Native oxides and carbonates of copper are soluble in sulphurous acid with the formation of cuprous sulphite, a salt insoluble in ordinary water, but soluble in water containing sulphurous acid from which the copper can be precipitated by driving off the excess of sulphurous acid by heat, the precipitate being cuprous sulphite, containing 49.1% copper, and is a heavy, crystalline compound of a dark red color, which settles readily from the solution and can be washed by decantation, dried and reduced to metallic copper by fusing on the hearth of a reverberatory furnace. The process is stated to be for sulphides or oxidized ores, the former being first roasted to expel the sulphur and convert the copper compounds into oxides, as sulphurous acid does not attack sulphides. The ideal ore is one carrying oxides or carbonates of copper in a siliceous gangue; lime and magnesia are objectionable, as they dissolve in sulphurous acid and, while they do not materially interfere with the reactions, they consume a certain amount of sulphur and so increase the cost of the process.

In practice the ore is crushed to pass a 20-mesh screen, placed in covered tanks filled with water containing sulphurous acid and kept in a state of agitation by forcing a current of sulphurous acid from the gas generators through the solution to bring each particle of the ore in contact with the acid and to keep the water saturated with sulphurous acid gas. The statement is made that all the copper will pass into solution in from one to four hours, depending on the physical condition of the ore.

The charge is then drawn into a settling tank, the sands allowed to settle for a few moments, when the solution, carrying more or less slimes, is decanted into a filter press to separate the solution from the slimes and force it to the precipitating tank. The sands in the tank and the slimes in the filter press are washed once with sulphurous acid, which is afterwards used in the treatment of the next charge. The dissolving tanks are arranged in series, one above the other; the gas entering the lower one and passing through each one in turn, the excess being finally absorbed in a condensing tower.

The precipitating tank is supplied with a steam coil through which the exhaust steam from the crushing plant is passed, heating the solution and precipitating the copper as cupro-cuprous sulphite which settles rapidly to the bottom of the tank. The solution from this tank is run into another tank while still hot and freed from small amounts of copper that is in solution as sulphate by means of a little lime. The precipitates are dried and smelted to fine copper. It is further stated that the plant can be so arranged that nearly all the sulphurous acid except that combined with the copper can be saved and used again; that one pound of sulphur is required to convert four pounds of copper into sulphite, and another pound of sulphur will keep the cuprous sulphite in solution, but that the greater part of this second pound of sulphur can be recovered. In practice about one pound of sulphur is required to treat three pounds of copper contained in the ore. The sulphurous acid is to be obtained either by burning pyrites or sulphur. When the original ore is a sulphide, it should furnish, by roasting, sufficient sulphurous acid for its own treatment.

Mr. Jennings states that in experiments made by him on ores in northern Arizona, 95% of the copper was extracted by leaching the ore for four hours; the ore was a mixture of blue and green carbonates with some oxide disseminated in sandstone the grains of which were firmly cemented by a secondary deposition of silica, making the rock harder to crush and more difficult to leach than an open-grained sandstone would have been, as the little particles of copper were coated with silica. The further statement was made that a plant will be erected for the treatment of copper ores of the Coconino plateau in northern Arizona.

THE extensive information as to the profitable nature of dredging for gold given by this paper has created a new era in that branch of gold mining, for its economic advantages are manifest. Large areas of placer ground, hitherto unworked, are shown to be susceptible of profit by this method, and in several States companies intelligently managed are making money. Given the right ground and the right machinery, with competent management, a moderate share of success may be assured. In this regard is to be noted the absolute necessity of thorough testing, prospecting, preliminary proof of the value of the ground that it is intended to work. As in all other cases, preliminary work of that kind is a matter of true economy. A case in point is afforded by last week's fiasco of the South Fork Hydraulic Mining Co., which proposed to operate this season on the South Fork of the Salmon river, 20 miles east of Warren, Idaho. With apparently the best of business intentions, the company organized, put up $20,000, which was spent in "getting ready," when the discovery was made that there was no gold in the claim. It is, of course, manifest that the company would have shown better business judgment in spending $5000, if necessary, in thorough prospecting of the tract it proposed to work, than in spending $20,000 in work that should have followed, not preceded, the necessary work of thorough prospecting. Nothing is to be taken for granted. It is foolish to spend any money on any proposition for dredging a tract of placer ground until prospecting shows that the gold is there, for every dollar so spent may save $10 later on. The company noted has sunk $20,000, with nothing to show for it but a little experience. The most hasty perusal of any one of the hundred expert technical articles on that very subject that have appeared in this paper would have saved the company their $20,000; but it is possible the projector of the scheme was one of those men who "don't propose to be told nothing by no paper."

IT seems to be the regular thing for mining men and mining institutions to growl at chambers of mines and mining bureaus. The Canadian miners are now calling the Central Canada Chamber of Mines some hard names, and claim that "it is run by a clique." Such things sometimes go that way. In the case referred to the blame seems to be deserved, though sweeping censure is not always in order. The acts of a mining bureau or chamber of mines are usually commensurate with the ability of its executive head, the amount of public money at its command, and the degree of public attention accorded to the institution. It is noted that the California Legislature has grown generous, and has raised the annual appropriation of $25,000 for the maintenance of the State Mining Bureau to $30,000, which is just one-tenth of 1% of the annual mineral yield of the commonwealth. It is further noted that the entire appropriation for the California State Mining Bureau for two years, made by the Legislature that adjourns to-day, aggregates $67,000. Of this, $29,000 is for field work, $28,000 for the maintenance of the Bureau in San Francisco, $7000 for printing reports, $3000 for reprinting reports. The appropriation clause repeats the requirement of two years ago, viz., that the field work shall be done by men appointed by the Governor, who shall also fix their compensation, thus making the State Mineralogist merely a figure-head, to sit in his office and do nothing except to draw a salary.

FRAUDULENT oil prospectuses and advertisements previously referred to are greatly in evidence, greatly to the detriment of the legitimate development of that great branch of the mining industry. Some of these advertisements are models of persuasion, so mixing fact and falsity as to deceive any one not posted. And the truth itself is worked in such a way as to imply a different meaning. In a glittering prospectus issued in Minneapolis, Minn., of a Kern Co., Cal., "oil property," urging the purchase of stock therein, is the statement: "It will be utterly impossible to predict what the price of this stock will be six months hence." It certainly will.

Concentrates.

SUNDAY work on the Comstock, Nevada, ceased Feb. 23, 1896.

IN California no lien exists as to laborers employed by the day.

THE California mineral land bill was not passed at the late session of Congress.

SYLVANITE is a telluride of gold, carrying tellurium, 55.8%; gold, 28.5%; silver, 15.7%.

THE cost of copper production at Anaconda, Montana, is understood to approximate 6½ cents per pound.

THE U. S. refiner who imports lead bullion to separate precious metals in bond is required to export 90% of the lead therein.

THE temperature of the water in a boiler, when the latter is in operation and carrying 180 pounds pressure by the gauge, is 379.4° F.

COPPER 80 pounds, tin 12 pounds, lead 8 pounds, silicon copper 2½ pounds, will make a superior bearing metal for railroad car brasses and other heavy stock.

IN application for patent, where the plat of the survey does not correspond with the field notes, it should be corrected so as to exhibit the subdivisions called for by the field notes.

EIGHTEEN CUBIC FEET of gravel in bank or 27 cubic feet dry, weigh a ton. Thirteen cubic feet average gold or silver ore in mine, or 20 cubic feet broken quartz, weigh a ton.

IN raising the temperature of pure water from 32° to 212° F., its volume increases .0466: 500 cubic feet water at 32° when raised to a temperature of 212° will have a volume of 523.3 cubic feet.

THE railroad freight on oil from Bakersfield, Cal., to San Francisco has been 46 cents per barrel; the tank steamer line from Ventura, Cal., freight to San Francisco is 15 to 20 cents per barrel.

THE California Mining Bureau makes free analyses of minerals from any part of the State, but qualitative only, never reporting on the percentage, as the commonwealth does not come in competition with professional assayers.

STEEL RAILS for railways are sold by the long ton. For European railways Pittsburg, Pa., now furnishes them at seaboard, f. o. b., at 1 cent per pound, $22.40 per ton. For American railway use the price is $20 per ton, f. o. b.

ACCORDING to sworn statements of officials, in the six months from July 1, 1900, to Jan. 1, 1901, the American Smelting & Refining Co. earned $2,950,000. During the same six months it is officially stated that the Guggenheims earned $2,250,000.

A MINING MACHINERY FIRM is entitled to a mechanics' lien for material furnished, it being expressly agreed in the contract that the supplies were to be furnished for the particular mine, mill or structure upon which the lien is claimed.

IN the case of a duplex direct-acting, triple-expansion engine, steam when superheated 125° F. will do 16% more work than when saturated. With steam so superheated and the feed-water passed through an exhaust heater, a given amount of fuel will produce 10% more work.

LEAD SULPHIDE DEPOSITS in metamorphic—or in eruptive—rocks are generally richer in silver than those in sedimentary strata. As a rule, also, galena associated with pyrites, blende and other sulphides—that is, impure ore—carries more silver than the purer mineral.

THERE is no authority for the amendment of a patented entry for the benefit of a transferer. In the absence of an adverse claim asserted within the period of publication, the Interior Department rules that it is warranted in the assumption that no such claim exists.

KEROSENE poured on the surface of cold water still, will not mix with the water; but if the water be violently agitated, the oil will reach all parts of the containing vessel. Kerosene oil and hot water readily mix, and the agitation of the water in a steam boiler when in operation will carry the oil to all parts of the boiler.

NORTHERN PACIFIC RAILWAY CO.'S tariff No. 4509 quotes from Mullan, Burke and Wallace, Idaho, to Omaha, Neb., $12 freight per ton on ore or concentrates worth less than $50 per ton; $14 between $50 and $65 per ton, and $16 over $65 per ton, "figuring 100% of the metals at the gross New York prices of refined metals."

THE Gilpin Co., Colo., mill crushes very slowly, and exceedingly fine, the sulphide crystals being broken so small that most of the gold films in the cleavage planes are exposed. Everything is so arranged as to secure the most thorough amalgamation possible with a battery and plates, the idea being to make even the sulphides yield enough of their gold for profit.

COPPER STATISTICS for 1900, so far as procurable, show a total U. S. production for the year of 268,681 tons. The corresponding figures for 1899 and 1898 were 262,206 and 234,272, respectively. U. S. copper imports for 1900 aggregated 89,431 tons. Last year's output of copper in this country was less than 5000 tons in excess of that of the preceding year.

TO CLEAN MERCURY digest with dilute nitric acid for twenty-four hours, taking one part acid to three of water. In retorting foul quicksilver to purify it the retort should only be half filled, and the quicksilver covered with a layer of quicklime or charcoal powder. The heating should then be done very gradually, the retort not being brought to a full red heat.

ON the 7th inst. lead was quoted in London at £13 15s per ton of 2240 pounds, equivalent to (exchange $4.85) $60 per short ton, or 3 cents per pound. On the same day lead was worth in Chicago 4.25 cents per pound. Freight on lead and insurance, Chicago to London, would figure $8.50 per ton; this from the $60 makes $51.50 per ton which the imported lead was worth in Chicago, so that there would be nothing in such exportation. U. S. tariff on pig lead is 2⅛ cents per pound.

REGARDING the detection of minute quantities of gold in ore, it has been shown that a white, infusible ash of paper acquires a red or purple coloration if the paper has been soaked in a solution which, when ignited, leaves metallic gold. For the extraction of gold, an efficient solvent is a mixture of ether and bromine, or one of equal volumes of bromine and aqueous hydro-bromic acid. An aqueous solution of iodine in hydriodic acid is also recommended. This method will detect 0.75 gramme of gold in a ton of ore.

THE duty of a reheater is the sum of two distinct actions—the drying of wet steam and superheating of the steam thus dried. For the first, it must be competent to supply the amount of heat per unit weight. The area of heating surface and the temperature-head producing flow into the drying stream, as it passes into and through the reheater, must be sufficient to furnish this amount and also the quantity per unit weight required to insure the demanded superheat for each unit weight of steam flowing through the reheater.

MERCURY mixed with grease or rosin becomes sluggish and large grains of gold will float upon its surface without being amalgamated. Its brightness is changed to a dull leaden color and it flours easily. Distillation will not purify the mercury from the grease or rosin, as these substances pass over in retorting and condense again. By washing the mercury in a strong solution of potash, obtained by leaching wood ashes, the flouring or sickening of the mercury may be overcome. An interesting and valuable article on recovery of greasy mercury, written by an expert, appeared in the issue of Jan. 13, 1900.

WHERE A applies for a patent for a claim located in 1898, and B and C have claims located in 1897 conflicting with A's claim, and they wish to bring adverse suit, either B or C (to make one suit of it and save expense) must convey to the other his interest. Two different owners can not join in an adverse suit. B or C must appear singly as the sole owner of the two claims. The adverse must be filed with an abstract of title in the land office where A's application was made within sixty days from the first appearance of his advertisement of application for patent, and the adverse suit in support of the adverse claim must be begun in a court of jurisdiction within thirty days after the adverse was filed in the land office.

A GOOD PROPORTION for mixing concrete materials for foundation work is as follows: To one barrel of cement—4 cubic feet—add 16 cubic feet of crushed stone, 9 cubic feet of sand, and from fifteen to twenty gallons of water, the whole making about 29 cubic feet. A batch of the above proportions makes, when tamped into place, 18 feet of concrete. The amount of material in a cubic yard—27 cubic feet—of concrete is: Cement, 5.8 cubic feet; sand, 11.6 cubic feet; crushed rock, 22.2 cubic feet. The difference between Rosendale and Portland cement is that in the former it is seldom the case that all the materials are so exactly proportioned that all of them are active, consequently there is a mass of inert material present in natural cement which, while it has no weakening effect, is useless and detracts from the value of the cement. In Portland, which has been called an artificial cement, the different ingredients are so proportioned that all are active and consequently every ounce of cement does its share of the work.

CYANIDE consumption is of individual requirement, ranging from 3¾ ounces to five pounds per ton of ore treated. Probably eight ounces per ton might be considered average. The consumption of cyanide in some mills is a considerable item. Some time ago the De Lamar, Nev., mill was credited with the usage of 900 pounds cyanide of potassium per day. At the time it was stated that the peculiar character of the ore there made it require three pounds per ton. The use of lime is a great saving in cyanide, correcting the acidity of the ore, neutralizing it, and aiding in cyaniding. The lime, dry-slacked and powdered, is added as the ore is charged into the tank, from one to two pounds lime per ton of ore. Like everything else in connection with the cyanide process, success depends upon exactness in quantity and method, which can only be secured by careful, intelligent experience in each individual case. It is possible to work $3 gold ore by the cyanide process at a profit, but it requires expert management.

THERE are two ways to find the size of pump necessary to fill or empty a tank or cistern of given capacity in a given time. First: Divide the number of gallons to be moved per minute by one-thirty-third of the piston speed in feet per minute; the square root of the quotient will be the diameter. Second: Divide the number of gallons in the tank or cistern by the number of minutes in which it is to be filled or emptied. Then divide the required capacity of the pump expressed in gallons per minute by the number of strokes per minute for a single pump, and twice the number if a duplex pump. Divide this quotient expressed in cubic inches by three-fourths the length of stroke in inches, and by .7854; the square root of the last quotient will be the diameter of the water cylinder. For instance: A tank contains 9000 gallons water, and is to be filled in thirty minutes: 9000÷30 =300, which divided by the number of strokes per minute (assumed to be 100 of 12 inches each) would give three gallons for one stroke, or 693 cubic inches; this divided by three-fourths the length of the stroke in inches, and by .7854=98, and $\sqrt{98}$=9.89, or, approximately, 10 inches diameter.

MICA may be white, amber or black. It is usually mined by making open cuts or pits, as often considerable dead work is required on both sides to secure the crystals intact. Dead work is the most expensive item in the mining, as the rock requires only crude culling, simple hoisting and pumping machinery, although in some places steam or air drills are employed to advantage in place of hand drills. There is often found in association with mica crystals apatite, calcite, fluorspar, hornblende, tourmaline, scapolite and quartz. Each pocket or lens is usually followed at greater depths by a similar pocket. The market value of mica depends upon the size of the plates, the ease with which it cleaves into uniform plates and its flexibility. It should be without holes or cracks, and should contain no trace of magnetic iron ore, as that makes it useless for electrical purposes. The mica is put on the market as "thumb-trimmed," being split into sheets about $\frac{1}{16}$ inch thick and sorted into different sizes or grades. The average price, delivered, varies. Pieces 1x3 inches would sell for about 7 cents per pound; 2x3 inches, 18 cents per pound; 2x4, 32 cents; 3x5, 75 cents; 4x6, $1.15; 5x8, $1.40; 8x10, $1.80.

IN California the right to the use of running water flowing in a river or stream, or down a canyon or ravine, may be acquired by appropriation. This must be for some useful or beneficial purpose, and when the appropriator or his successor in interest ceases to use it for such a purpose, the right ceases. The person entitled to the use may change the place of diversion, if others are not injured by such change, and may extend the ditch, flume, pipe or aqueduct by which the diversion is made to places beyond the first use. The water appropriated may be turned into the channel of another stream and mingled with its waters, and then reclaimed; but in reclaiming it the water already appropriated by another must not be eliminated. A person desiring to appropriate must post a notice in writing, in a conspicuous place at the point of intended diversion, stating therein: First, that he claims the water there flowing to the extent of (giving the number) inches, measured under a 4-inch pressure; second, the purposes for which he claims it, and the places of intended use; third, the means by which he intends to divert it and the size of the flume, ditch, pipe or aqueduct in which he intends to divert it. A copy of the notice, within ten days after it is posted, must be recorded in the Recorder's office of the county in which it is posted. Within sixty days after the notice is posted the claimant must commence the excavation or construction of the works in which he intends to divert the water, and must prosecute the work diligently and uninterruptedly until completion, unless temporarily interrupted by snow or rain. Completion means conducting the water to the place of intended use. By a compliance with the above the claimant's right to the use of water relates back to the time the notice was posted, but a failure deprives the claimant of the right as against a subsequent claimant who complies.

FOR determination of lead in galena, transfer two grams of the finely powdered ore to a 4-inch porcelain evaporating dish; add 25 cc. nitric acid, warm, then 15 cc. sulphuric acid, and evaporate carefully until red fumes cease to be evolved, and the residue is nearly dry. Allow to cool, add a few drops of dilute sulphuric acid and 75 cc. water, bring to a boil, filter, and wash well. Neglect the filtrate. Wash the precipitate from the filter into a No. 3 beaker, using not over 75 cc. water; add 100 cc. of a solution of sodium carbonate in water (1 to 10) and boil the contents of the beaker for fifteen or twenty minutes. Solution must be strongly alkaline. By this action the lead sulphate, formed by the nitric and sulphuric acids upon the sulphide, is converted into carbonate. Filter, wash well with boiling water until reaction of washings is no longer alkaline. Neglect the filtrate. Wash the precipitate into a No. 3 beaker with about 75 cc. of water, add 75 cc. strong acetic acid, warm, and keep the contents of the beaker at boiling temperature for ten minutes, the beaker being covered with a watch glass. The lead carbonate is thereby decomposed and soluble lead acetate formed, while any silica or gangue remains insoluble. Filter, wash well with hot water until the washings are no longer acid. Neglect the residue on the filter. To the solution of lead in the beaker, which should not exceed 150 cc. or 200 cc., including the washings, dilute sulphuric acid is added in slight excess until no more precipitate is formed. After standing for half an hour the lead sulphate is filtered upon a No. 3 ashless filter, and washed thoroughly with hot water. Dry at 102° C. Transfer the lead sulphate from the filter paper to glazed paper, and ignite the filter paper in a weighed porcelain crucible. After complete incineration, allow to cool, add a few drops of dilute nitric acid, and warm gently. (Any lead reduced from lead sulphate by the burning paper will be dissolved, forming lead nitrate.) Add three or four drops of sulphuric acid and evaporate to dryness; add the rest of the lead sulphate that is upon the glazed paper, and ignite contents of the crucible to redness; cool to desiccator, and weigh; repeat to constant weight.

The Parral, Mexico, Mining District.

To THE EDITOR:—It seems almost incongruous to speak of Parral as a mining town. Sleepy, inexpressibly dirty, of devious and crooked by-ways, there is but little to identify this Mexican camp with the hustling, bustling mining towns of the United States. Reached by a leisurely little branch of the Mexican Central, which leaves the parent stem at Jimenez, Chihuahua, and meanders with infinite deliberation through fertile corn fields to the west, one is more inclined to believe that he has inadvertently strayed from his original destination into some far eastern land—in fact, one's thoughts are irresistibly carried to the Holy Land by a haunting similarity of aspect, both in country and people.

Appearances to the contrary, however, Parral, or, more correctly speaking, the Parral district, is one of the largest mining centers in the republic. Much foreign capital is invested, both in mining and milling enterprises, and, in addition to late mineral discoveries, many old Spanish workings that enriched the conquistadores 300 years ago are being exploited by modern methods with most satisfactory results.

Fast Freight System, Parral, Mexico.

In the immediate vicinity of Parral there are but three mines, the Jesus Maria, Taja and Prieto. They are situated on a sharp little knoll that rises precipitously from the edge of town, and are all old discoveries of the Spaniards, but were abandoned in later years by the Mexicans for lack of adequate machinery to control the flow of water encountered with depth. With the exception of the Taja, which is the property of Mexicans, but is under a fifteen-year lease to Kansas City people, these mines are owned and operated by Americans. The Prieto is controlled by Denver men, and in connection they have erected a large mill, principally for the treatment of their own ores, but also with the object of receiving custom work. It embraces the two processes of concentration and lixiviation, and is fully equipped with every modern appliance.

Bird's-Eye View of Parral, Mexico.

The objective points for the majority of mining men coming to Parral are the old Santa Barbara district, worked by the Spanish decades ago, and the more recent discoveries known as Minas Nuevas, distant from Parral 7 miles. At the former place are situated the properties of the Montezuma Lead Company, as well as the big Tecolote mine, purchased by the Guggenheims six months ago. At Minas Nuevas are located some of the richest silver mines in the State of Chihuahua, notably the Refugio, owned by Angel Garcia. It is related that Garcia was approached by some promoter in regard to getting an option on the property. The old man drew out his watch, glanced at it, and replied that he would give just twenty-four hours' option. If at the end of that time there was $1,000,000 gold in the bank to his credit the mine could be bought. Needless to say, it is still in the possession of Senor Garcia.

One of the most distinctive features of the country, the freighter and his mule or burro train, is slowly giving way before the rapid advance of the railroads. Minas Nuevas has for some four months been in communication with Parral by means of the Parral y Durango railroad, which is a private enterprise built and operated by Pittsburg capitalists, whose holdings, including mills and mines, are very large in Minas Nuevas. This same company is running a narrow gauge line into the mountain woodlands, which will greatly facilitate for them the solution of the fuel question.

Santa Barbara is now reached by a spur of the Mexican Central, which is pushing its way to the Durango State line and will tap the rich mining and agricultural district contiguous to Rosario. Naturally, many of the smaller and more inaccessible interior towns will never cease to depend upon mule and burro trains, and the humble, long-enduring little animals will continue to be an important factor in their existence.

Deep mining is the rule of the entire Parral district, and is essentially not a poor man's proposition. Mining here is practically open only to rich companies.

There are, of course, sporadic cases of "grass root" propositions, but they are very rare, and in the generality of cases have been gathered in by some Mexican, whose eye for ore, by the way, is simply phenomenal. And here it might not be inopportune to say that there is much misapprehension in the minds of many Americans coming here from the United States in regard to the ability of the average Mexican to recognize a good thing when he sees it. He is not only an excellent judge of ore, but is as difficult to deal with as the keenest Boston promoter. One generally finds him in supreme possession of the most desirable properties, either through denouncing or that most objectionable dog-in-the-manger method, the zona, which effectually keeps everyone at a distance while the gentleman makes up his mind whether he really wants that special piece of ground or not.

The mining of the Mexicans is as a rule carried on after the primitive fashion set by their forefathers. The shaft is usually a small, square hole zigzagging along the vein, where the ore has been followed and gouged out regardless of method or safety. A slender pole with steps roughly notched in, familiarly known as a "chicken ladder," forms the only means of communication between the workings and terra firma. All ores and waste are laboriously carried up in small rawhide bags, called "zurrones," on the backs of peons, sometimes as high as 300 pounds to the load. Their implements are crude and rough, and one can only marvel at the amount of work accomplished with the means given. Here is where foreign capital and enterprise come in. Most of the mining supply companies of the United States have representatives here, and many thousands of dollars have been spent during the last two or three years in machinery for the Parral district. The American mine operators here are credited with having advanced wages fully 50%, but the result is regarded a trifle dubiously by the more thoughtful. Mexican character is a thing peculiar unto itself. The peon is absolutely without ambition. Given a blanket, enough to eat and smoke and he toileth not, neither does he spin until driven out by actual necessity. As he now makes from $1.00 to $1.25 per day where he formerly earned 60 to 70 cents, he consequently works only ten days where he worked twenty under the old regime. From observation I am inclined to believe that the so-called cheap labor of Mexico is cheap in every respect and quite as expensive in the end as higher priced but more competent labor. For example, I was a witness the other day of the erection of an ordinary windlass. The American in charge was actually obliged to start the nails for his workmen, notwithstanding the fact that they had just received most flattering mention as being, all of them, highly efficient in every way around a mine. The peon is willing, but, like the man from Missouri, he has to be shown. Anyone of an economic turn can readily figure what this means where a large force of natives is employed.

The experiment of employing Chinese labor in the mines has been tried in the State of Zacatecas with apparently satisfactory results, and it would not be surprising if this should prove to be the solution of the labor question for the vexed mine manager. Whatever debatable qualities the Mongolian may possess upon his native heath, he is certainly a dependable and industrious quantity abroad.

Impartially summing up the situation, however, one can but be impressed by the immense possibilities presented by the mining industry in Mexico. It is yet in the very longest of swaddling clothes, and under the combined effect of capital, improved methods and well-directed scientific knowledge there is practically no limit to future achievements. One naturally contends with different obstacles in different countries, but as there is no problem without its adequate solution, it can confidently be counted upon that the new century will see Mexico well to the front in the modern mining world.

Parral, Mexico, March 1. AMERICAN MINER.

Colorado Chlorination Plant.

To THE EDITOR:—The new chlorination plant of the Standard M. & S. Co. at Colorado City was started on the 1st inst. Erection of the plant was begun in May, 1900. The ore first goes through crushers into the sampling department, which has a capacity of fifty tons per hour, thence conveyed to a bedding floor 200x100 feet, capable of storing 12,000 tons of sampled ore. From the bedding floor ore is conveyed to driers, 151x12 feet, capacity 600 tons per day. The ore then goes to the fine crushing department, which contains seven sets 14x30 belted rolls, etc., then to storage bins, from which it is conveyed to four roasting furnaces, each having a capacity of 100 tons per day. It is then cooled automatically and conveyed 400 feet to the chlorination department, containing eleven 10-ton barrels, each having a capacity of from forty to fifty tons per day. From here the solution passes to the precipitating building, containing eighteen tanks with a capacity of 200,000 gallons, eight of these tanks being used for precipitating gold from solution, and ten for settling and storage purposes. This department also contains nine filter presses, which collect the precipitated gold sulphide. This is dried, roasted and refined into gold ingots, and afterwards melted into bricks for shipment to the Denver mint. Tailings from the tanks are discharged automatically into receiving pits and tanks, from which they are distributed to concentrating tables, sixteen being used for preliminary concentration and four as finishers. From these tables the tailings are distributed to other concentrators, and from the latter they are sluiced to the waste dumps. The entire plant is driven by twenty-eight electric motors, ranging from 10 H. P. to 225 H. P. The pumping plant, located 2500 feet away, consists of a 13x18 triplex pump, capacity from 1,500,000 to 2,000,000 gallons per day, driven by a 120 H. P. synchronous motor directly connected to the pump.

Colorado City, Colo., March 9.

Some Business Suggestions.

To THE EDITOR:—Don't you think it would be business for you to compile a weekly letter telling of contemplated plants and machinery requirements and equipments, and send it to your advertising patrons, that they may have advance information as to who is in the market, or likely to be, for mining material? I have seen such announcement, in the shape of a circular letter, sent to men in the business of supplying mining machinery of all kinds, and would like to see the MINING AND SCIENTIFIC PRESS in the lead in this, as it is in other things. S. C.

Denver, Colo., March 8.

The idea is an excellent one and is being constantly acted upon by this paper in a way that gives the suggested information in a fresher and better form than in the way spoken of. Instead of waiting until such business news is stale and valueless, this paper weekly publishes the freshest and newest announcements in that line, those business pointers being found in every issue under the head of "Mining Summary," which, while furnishing the latest news of general interest as to what is being done, apprises dealers in and manufacturers of mining machinery of what is now or is likely to be in the market for mining appliances and materials of all kinds, being from one to three weeks ahead of contemporary efforts in the same direction. This is one of the established features of the paper and appears in every issue.

The Manufacture of Uranium Compounds.

NUMBER II.—CONCLUDED.

Written for the MINING AND SCIENTIFIC PRESS by DR. J. OHLY

Determinations of the oxide U_3O_8 in ores from Paradox show the following percentages:

Samples.	Per cent.
I.	2 09
II.	3 19
III.	3 89
IV.	4 73
V.	8 68
VI.	17 06

If we establish, now, the average of the uranium percentages given above by dividing the sum of the items mentioned by the number of samples analyzed, the result will be the figure 6, cited before, as indicating the uranium contents of the ores at the mines on the aggregate.

In case it is intended to manufacture the crude compound mentioned before from pitchblende, or the oxide, or sodium salt, which latter is generally represented by the formula $Na_2U_2O_7 6H_2O$, and known in trade as uranium yellow, three methods are available for their production. The first point to be attained consists, of course, in the selection of the cheapest method effecting a perfect solution of the uranium contents in the mineral, and for that purpose a mixture of nitric and hydrochloric acids in the portion of one to three, known as "aqua regia," will be found to be the cheapest and most effective. The lixiviation and separation of the siliceous residues remaining is the next step in order, when the clear solution thus obtained is precipitated with caustic soda, and the insoluble sodium salt, contaminated with ferric oxide, alumina and lime, which settles in the bottom of the vessel, may be purified by washing with water, since this salt as well as potassium uranate is almost insoluble in the former. It is evident, also, from the points given above that the purity of the final crude but commercial product resulting depends largely upon the amount of admixtures contained in the pitchblende originally used, and that a careful sorting and chemical testing must precede the treatment intended, so as to calculate the amount of sodium uranate obtainable beforehand, and thereby the value of the merchandise produced.

A second procedure for the preparation of the crude uranium compound consists in fusing the pitchblende—which, by the way, is not known to carry any vanadium,—in open crucibles with a mixture of sodium carbonate and nitre, thoroughly incorporated with the powdered mineral, when the oxidizing capacity of the latter will induce the formation of sodium uranate, which may be recovered from the cooled and subdivided mass by lixiviation. Since uranates of sodium and potassium are soluble in acids, a method is given thereby for precipitating the oxide of uranium (yellow) by means of ammonia from solutions of the crude compound, which operation would besides contribute to the purification of the final product to some extent.

When manufacturing the pure sodium salt, free of admixtures, on the large scale, another process is, however, resorted to, which is more costly than those given above, but allows of the immediate disposition of the commercial product resultant at current prices. In this case, 100 parts of pitchblende, which should contain as a rule 45% of uranium oxide, are thoroughly mixed with fourteen parts of burnt lime, and the mixture thus produced roasted in a reverberatory furnace, with the result that a calcium uranate is formed. On adding dilute sulphuric acid to this compound, the calcium of the lime combines with the acid under the formation of insoluble calcium sulphate or gypsum, while the uranium sulphate resulting enters in solution. The latter is drawn off, after the gypsum has settled to the bottom of the vat employed, when sodium carbonate is added, which precipitates the uranium and other metals present. Since an excess of the precipitant has, however, the peculiarity of dissolving the uranium salt formed, the values of that metal are brought into solution by adding sufficient quantities of the same, when the clear solution is siphoned off, and carefully—that is, very slightly—neutralized with dilute sulphuric acid. If now, the liquid is heated to boiling, a finely divided hydrated sodium uranate of the formula $Na_2U_2O_7 6H_2O$ gradually deposits from the liquid and settles in the bottom of the vat. This salt is subsequently separated from the superantant fluid and dried in the air, when it is brought on the market under the name of uranium yellow, which has, like the oxide, the peculiar property of imparting a remarkable fluorescence to glass and change it into the so-called "uranium glass" by the formation of a sodium-uranium silicate. This soda salt, when exposed in contact with porcelain to the heat of a muffle furnace, yields a fine fluorescent orange in the enameling fire, and a beautiful velvety black at higher temperatures, so that it has found extended application as a paint in the decoration of porcelain or china.

Another compound of uranium, also known in trade as "uranium yellow," but differing in composition from the salt just described, results on the addition of ammonium chloride or sulphate to a boiling solution of sodium uranate, obtained according to the directions given above. The hydrated ammonium uranate resulting in this manner, which is dried and gently heated after its separation from the mother liquid, possesses the same characteristics as the sodium salt, and is even preferred for porcelain painting on account of its readier decomposibility and the deep, jet black coloration which it imparts to chinaware when exposed to the heat of the enameling furnace.

The main and most modern uses of uranium compounds consist, however, in their application as alloys to other metals, and of these the carbide is of special interest and importance, since it has a higher fusing point than platinum, and serves, therefore, as a substitute for the latter in the manufacture of pyrometers and similar instruments. Its improving properties as to elongation, tensile strength and toughness, when added to steel, are known to surpass by far the effects produced by nickel and tungsten, so that the carbide seems to be destined to outrank all other competing metals or compounds in the manufacture of high class steel, armor plate or ordnance.

Besides the purely commercial considerations, uraninite or pitchblende is of great scientific interest, since it gives off the rare gas argon, when heated with sulphuric acid, and produces its own photograph, so to speak, when placed on a sensitive plate. As to the latter property, which is known as radio-activity, it stands at the top of the scale among minerals thus endowed, and the photograph which it produces under the conditions indicated, and the subsequent development of the negative thus obtained, is very distinct and bright. Sir William Crookes of London, the inventor of the tubes named after him, has been busy in this line lately, and the results obtained by him in this respect are remarkable, if not curious. Anyone interested in these researches will be favored with a pamphlet containing descriptions of experiments made, and also a table showing the photographs mentioned above, on addressing Sir William Crookes, 7 Kensington Park Gardens, London, W.

Wet Process Copper Extraction in Arizona.

TO THE EDITOR:—The new groups of mines of the Jerome district extend along the eastern slope of the Black Hills range, overlooking the Rio Verde valley, 3 to 7 miles from Jerome.

The Brookshire belongs to the Geo. A. Treadwell M. Co. and is in charge of G. W. Hill. A shaft, now 2000 feet deep, is being sunk deeper. It cuts through the incline ledge of ore at 200 feet.

The Cliff group, near the Brookshire, is being developed by a tunnel, now in 560 feet, in a southwesterly course. It will tap the ledge, which is in a contact between slate and syenite.

The Iron King mine, a little farther southeast, belongs to the Equator M. Co., in which W. A. Clark is interested. The development here is by means of tunnels, winzes, upraises and crosscuts. An upper tunnel taps the main ore ledge 270 feet from the entrance, cutting into the sulphide stratum, which underlies the oxidized ores nearer the surface. The copper and iron sulphides below carry about 10% copper, with some gold and silver, and run only about 10% silica, but high in iron. The plan, as stated by Supt. Giroux, is to fully develop the property and determine as to the grade and extent of the ore. If conditions warrant it, after the property is developed, the United Verde & Pacific Railroad will be extended from Jerome to the Iron King, a distance of 7 or 8 miles.

The Copper Chief adjoins the Iron King on the west, both groups being on the same ore body; they were formerly in one and known as the Equator, but conflicting interests arose as to location, and, after a great amount of litigation, the group was divided, as appears now. The Copper Chief is about 2800 feet above the Verde valley; the ores are oxidized from the surface down, 240 feet, the ledge on this property being about 150 feet wide. The oxidized ores are defined by Supt. Arthur Hendy as a sand carbonate, running about 1½% copper, carrying gold, silver and lead to the value of $18 to $20 to the ton, and containing from 50% to 96% silica. The vein stands nearly vertically between a porphyry hanging wall and a diorite foot wall. A shaft sinks 450 feet on the ledge; it is two-compartment, having ladderway, with landing at every 20 feet. From the shaft four levels have been run. The shaft, levels, winzes, etc., aggregate 3000 feet. A small amount of stoping has been done, the production thus far being the result of development work. Below the 240-foot level the sulphide belt is reached here the same as on the Iron King. Mr. Hendy estimates 250,000 tons of the oxidized ores returnable on the Copper Chief. An experimental lixiviation, leaching and precipitating plant is in operation on the ground, which is to be enlarged, as the method employed is suited to extracting the gold, silver and copper from the oxidized ores. The ore is hoisted and passed through crushers, rolls, screens, reducing it to an 8-mesh, thence into a set of ore bins. From the bins it passes to a roaster, in which, by the use of salt, the metals in the ore are chloridized. It passes from the roast chamber over an inclined iron floor into cars, from which it is dumped into ore tanks, each 24 feet diameter and 6 feet deep, holding 100 tons of ore. Solution tanks are set a few feet above the ore tanks, holding a solution of hyposulphite of soda, which is subjected to heat by steam radiators, then decanted into the ore tanks. After the leaching herein, the tailings are sluiced out through discharge gates at the side; but, when a charge in the ore tanks is ready, it is subjected to a wash water, the latter gathering some of the values, to save which the water is conveyed to special tanks, in which the copper, gold and silver is precipitated by scrap iron. After this washing the hyposulphite solution is applied to the ore. The solution now holding the values passes to precipitating tanks below, when the lead is precipitated by carbonate of soda, bicarbonate of soda or lime. The lead precipitate is gathered from the bottom of these tanks after the solution containing the other values has been drawn off into other tanks below. From the latter solution the gold, silver and copper are precipitated by sodium sulphide. The liquid is drawn off the precipitation tanks into settling tanks, thence into montjus tanks, from which it is forced up to the storage tanks again by compressed air. The precipitate is washed out into a wrought iron pressure tank, which connects with the filter presses.

This property belongs to a company of Connecticut people. The mill is set on the side of the hill, having a 26° incline, by which everything is handled by gravity.

Near Jerome is the Verde Consolidated group, which adjoins the News, Black Hills and Venture groups. It includes six claims and covers a north and south ledge, which is being opened by tunnel work. WASCOTT.

Jerome, March 4, 1901.

Mineral Production of British Columbia.

From the returns of the mineral production of British Columbia for the year 1900, submitted to the local Legislature by the Provincial Minister of Mines on March 5th, it is gathered that there was during the year an increase in the value of the output of the lode mines of the Province of $3,310,428 and a decrease in that of placer gold of $66,176, leaving a net increase in metallic minerals for the year of $3,244,252. There was also an increase of $1,013,238 in the value of coal and coke. No returns are yet available of the value of other non-metallic minerals, so these cannot now be taken into account. The foregoing figures, though, exhibit practically last year's net increase, which was $4,257,490, as shown in detail in the following table:

	1899.	1900.	Increase.	Decrease.
Placer gold..	$1,344,900	$1,278,724	.....	$66,176
Lode gold...	2,857,573	3,461,067	$603,494	.....
Silver.....	1,663,708	2,295,099	631,391	.....
Copper.....	1,351,453	1,615,289	263,836	.....
Lead.....	878,870	2,690,577	1,811,707	.....
Coal and coke	4,053,651	5,066,889	1,013,238	.....
Total...	$12,150,155	$16,407,645	$4,323,666	$66,176

The total mineral production of the Province for all years up to and including the year 1900 is as under:

Gold (placer)	$62,584,443
Gold (lode)	12,820,546
Silver	13,635,708
Lead	6,543,358
Copper	5,437,871
Coal and coke	49,426,700
Other minerals (approximate amount)	2,000,000
Total	$152,448,626

The number of tons of metallic ore mined in the Province in 1899 was 287,343 and in 1900 554,796, the increase for last year having been 267,453 tons. The respective increases for 1900 over 1898 were: In quantity of metallic ore mined, 338,852 tons, and in value of metallic minerals, coal and coke, $5,652,284' the latter being an increase of more than 50%.

British Columbia Development.

TO THE EDITOR:—The first shipment of copper matte ever sent from the Boundary Creek section of the Boundary district was made to-day by the British Columbia Copper Co. of New York. This company owns the Mother Lode copper mines, near Greenwood. It has its own smelter at that town. The furnace was blown in on February 18th and to date about 175 tons of matte have been produced, the grade of which has been gradually improved until now it is up to 50% copper. Between 300 and 400 tons of practically self-fluxing ore are being run through the furnace every twenty-four hours.

The Dominion Copper Co., of Toronto, will put in a new plant at its Brooklyn and Stemwinder mines at Phœnix within three months—an air compressor, steam cylinders 18-inch and 34-inch diameter by 36-inch stroke, air cylinders 18-inch diameter by 36-inch stroke; ten 3¾-inch drills with double-screw columns, a 54x12 air receiver and a feed water heater, capacity 200 H. P., constituting a 20-drill plant. The following additional plant for the Stemwinder will also go in: A Bullock diamond drill equal to drilling a 1000-foot hole and 1000 feet of rods; a five-drill air compressor; 60 H. P. locomotive boiler, and a 42x8 air receiver.

Greenwood, B. C., March 4.

Mining and Metallurgical Patents.

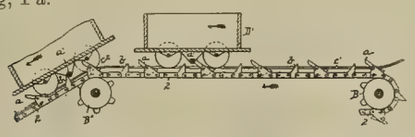
Patents Issued March 5, 1901.

Specially Prepared for the MINING AND SCIENTIFIC PRESS.

SUBMARINE MINING MACHINE.—No. 669,276; A. Allen, Spokane, Wash.

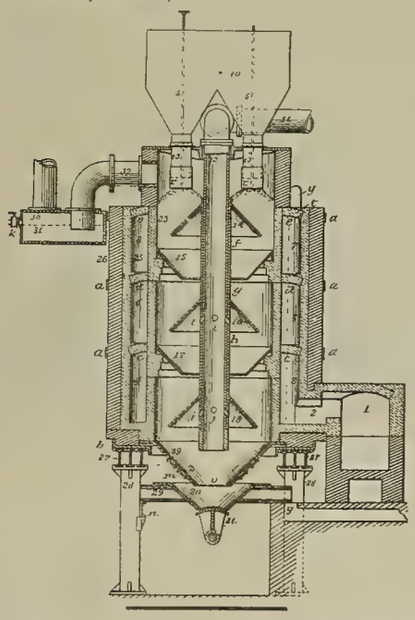
Open-ended sluice box, upper cover portion and base portion removably secured together, to rest throughout its length on and to be dragged along subaqueous bottom, scraper adjustably secured to forward end of box to form continuation of base, operating to deliver material of bottom directly into box, fender plates on base at each side of scraper, compressed water jet pipe discharging into box toward rear to induce current therethrough, riffles in base receiving and retaining precious particles separated from material in its passage, means for dragging box backward and forward along bottom, box in its forward movement receiving, separating and discharging material under water.

CAR HAUL.—No. 669,111; A. M. Acklin, Pittsburg, Pa.



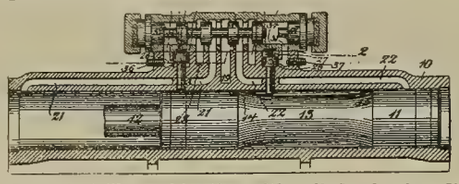
Device for moving or controlling movement of cars down incline, chain having rigid and pivoted hooks thereon adapted to engage with car, in combination with car track having ascending and descending portions thereon, chain arranged on lower level at receiving end with relation to car track.

ART OF EXTRACTING ZINC FROM ORES.—No. 669,410; F. Guiterman, Denver, Colo.



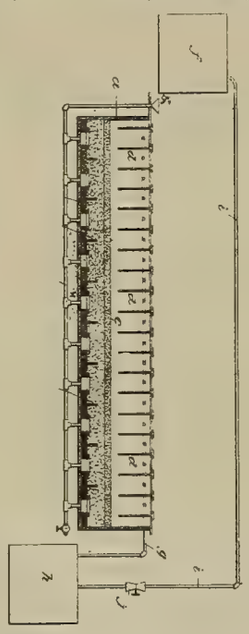
Process of extracting zinc from its oxidized ores containing corrosive metallic oxides, which consists in introducing oxidized ore in divided or granular condition into receptacle, heating ore through walls of receptacle to high temperature, but below volatilizing temperature of zinc, maintaining ore in permeable and mobile condition during operation of heating, introducing into intimate contact with ore current of reducing gas, under pressure, throughout heating, continuing heating and action of reducing gas until corrosive metallic oxides are reduced, withdrawing ore, finally recovering metallic zinc therefrom by distillation.

PRESSURE ACTUATED VALVE FOR ROCK DRILLS.—No. 669,316; R. L. Ambrose, Tarrytown, N. Y., assignor to Rand Drill Co., New York, N. Y.



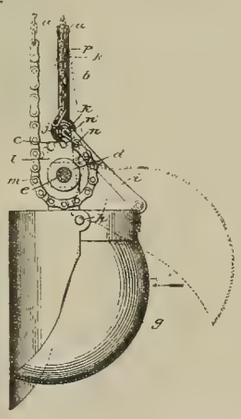
In rock drill, combination with cylinder having distributing ports leading to and from opposite ends thereof, inlet port and exhaust port contained within cylinder casing but out of communication with interior of cylinder, pressure chambers arranged at opposite ends of distributing valve, each chamber having port leading to exhaust, two independent primary valves for ports arranged in cylinder casing and projecting into interior of cylinder, reciprocating piston having reduced central shouldered portion, primary valves arranged at such point in cylinder as to be always covered by piston during its movements, to be operated by engagement with central shouldered portion thereof.

METHOD OF RECOVERING METALS BY ELECTROLYSIS.—No. 669,440; H. A. Frasch, Hamilton, Canada.



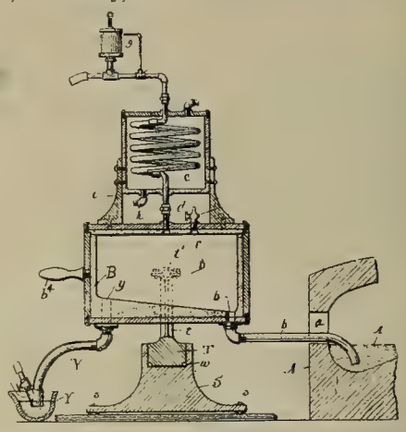
Method of recovering copper and nickel, from matte or ore, by electrolysis, disintegrating or pulverizing metal-bearing matte or ore so as to render it freely permeable by electrolyte capable of combining with metal or metals to be extracted, distributing mass over bottom of vessel in which electrolysis is conducted in connection with electric conductors to constitute an anode, covering anode with granular, permeable, electrically neutral substance, suspending in electrolyte number of cathode plates upon which metal is collected, passing electric current between anode and cathode.

DREDGING BUCKET.—No. 669,446; O. B. Morris, Camden, N. J.



Combination of framework, comprising crossbar and uprights, bucket having stationary, shovel-like jaw rigidly secured to uprights, and movable jaw pivoted to rigid jaw, crossbar or beam adapted to slide upon uprights, link connections between movable jaw and beam, whereby movable jaw is opened and closed by movement of beam, shaft journaled in uprights, sprocket or chain wheel carried by shaft, chain engaging sprocket or chain wheel having one end connected to sliding beam, its other end connected to suitable power mechanism, power connection for sliding beam.

APPARATUS FOR WITHDRAWING MOLTEN METAL FROM FURNACES, ETC., AND CHARGING SAID METAL INTO MOLDS, ETC.—No. 669,466; J. McRae and G. H. Kitto, Dollar Bay, Mich.



Combination of vessel adapted to receive charge of molten metal from furnace and provided with suitable pipe or conduit for passage of metal, independent suction pipe whereby air may be exhausted from vessel, relief valve having adjustable opening for air located above space to be occupied by metal, whereby flow of metal from vessel can be controlled, relief valve being arranged independently of exhaust mechanism in order that extent of vacuum within vessel may be modified while action of exhaust mechanism persists.

Correction of an Omission.

In the valuable technical article on "Petroleum Oil Pipe Lines" in the issue of the 9th inst. there was an omission in one of the tables that interfered with its accuracy. The table is here reproduced in its correct form:

VISCOSITY SECONDS FOR 50 C.C.

RESULTS OBTAINED WITH REDWOOD'S STANDARD VISCOMETER.

Temperature.—° F.	Water.	AMERICAN MINERAL OIL.			RUSSIAN MINERAL OIL.		
		Sp. G. 0.885	Sp. G. 0.913	Sp. G. 0.923	Sp. G. 0.909	Sp. G. 0.915	Sp. G. 0.884
50	....	145	425	1030	2040	2520	.....
60	25½	105	295½	680	1235	1980	.....
70	....	90	225	485	820	1320	.....
80	....	73	171	375	580	900	.....
90	....	63½	136	262	426	640	.....
100	....	54	111	200	315	440	1015
110	....	50	89½	153	226	335	739½
120	....	47	78	126	174	245	531
130	....	44¾	63½	101	135½	185	398½
140	....	41	58	82	116	145	327½
150	....	37½	52	70½	95	115	230
160	....	.....	46	63½	83½	93½	200
170	....	.....	.....	58	70½	77½	161
180	....	.....	.....	52½	61½	67½	134½
190	....	.....	.....	47	56½	61	115½
200	....	.....	.....	42	48½	54	99½
210	....	.....	.....	40	.....	.....	85
220	....	.....	.....	38	.....	.....	77
230	....	.....	.....	.....	.....	.....	70½
240	....	.....	.....	.....	.....	.....	64½
250	....	.....	.....	.....	.....	.....	59¼
260	....	.....	.....	.....	.....	.....	54
270	....	.....	.....	.....	.....	.....	48½
280	....	.....	.....	.....	.....	.....	46½
290	....	.....	.....	.....	.....	.....	44½
300	....	.....	.....	.....	.....	.....	42⅔

Verde Queen, Arizona, Smelter.*

The Verde Queen shaft has reached the water level and sulphide ore at 330 feet depth. On the upper levels the ore contained iron oxides, green and blue copper carbonates and copper silicates. It was on this class of ore that the 40-ton smelter has been running. As a result of their operations three carloads of bullion, running 96% copper, have been shipped. An additional furnace of 100 tons daily capacity will be put in soon, after which their smelter will operate as a matte smelter on the sulphide ores. In the operations thus far, the charge usually ran 7% copper and 30% aluminum, the slag running 1% to 1¼% copper, 39% silica and 22% aluminum, which certainly was very careful work. This company's grounds extend from the edge of the town of Jerome southeastward toward the Verde valley. WASCOTT.

Jerome, March 2.

*See illustration front page.

MINING SUMMARY.

Specially compiled and reported for the MINING AND SCIENTIFIC PRESS.

ALASKA.

Weber & McDonald, operating on Slate creek, near Rampart City, recently cleaned up $750 after an eleven days' run. Gravel running 40 cents to the pan is being taken out. —— Reports from Teller City state that on Nov. 18th last a strike was made on Birch creek, near there, by Johnson & Williamson.——It is reported that ground running 17 cents to the pan is opened up on American creek, a tributary of the Agiapuk river, in Kougarok district, about 60 miles from Nome.

ARIZONA.

GILA COUNTY.

A New York company has acquired the Grand Prize group of eight claims in the northern part of Tonto basin, 11 miles north of Payson and 6 miles south of Pine. This is about 100 miles south of Flagstaff and nearly the same distance northwest of Globe. The group has been developed sufficiently to show a good body of oxidized copper ore near the surface and copper sulphides at water level. It is claimed there are about 6000 tons of ore now accessible, which will average 12% copper. Water and timber are abundant. The Grand Prize Copper M. Co., which controls the property, will at once erect an 80-ton smelting plant on the ground. It is claimed the ores carry gold and silver in values that will be important in the result.

Payson, March 2.

GRAHAM COUNTY.

The General Electric Co. of New York is buying eighty-two copper mines and prospects in the neighborhood of Metcalf, and two mines in the district adjoining the Copela property, in central Sonora, Mexico, to secure its own supply of manufacturing copper.

MARICOPA COUNTY.

Willis B. Troy and associates are the purchasers of the Vulture mine, to operate which the Vulture Gold Co. has been incorporated. It is planned to put in an electric power plant on the Hassayampa river, from which power to run the mine and mill machinery will be transmitted to the mine, 16 miles distant. It is also proposed to lay a pipe line from the same stream to convey water to the property for mine and mill purposes. WASCOTT.

Wickenburg, March 8.

At the Cram Mountain copper mines, near Phœnix, tunnel is in 400 feet; thirteen men are employed.

The Phœnix Reduction Co., capital $250,000, has incorporated at Phœnix.

MOHAVE COUNTY.

The Arizona & Utah Railroad, standard guage, runs daily trains between Kingman and Chloride, a distance of about 25 miles. The original plan and future prospect is to extend this line northwestward from Chloride, via the White Hills, across the Colorado river into Lincoln county, Nev., possibly to connect with a Los Angeles-Salt Lake line.

At Chloride mine operators and prospectors are busy. Operations here have been retarded some by lack of fuel supply, with the result that many of the steam plants are being provided with oil burners, with the idea of using crude oil from southern California. Some of the oil producers of that section have established storage tanks here, from which those using fuel oil will be supplied. Each mine and mill using it is having tanks put up, in which to keep a supply on hand. At the Tennessee mine and mill is a redwood tank that will hold 100 gallons of the crude oil. The impurities in it are principally asphaltum and sand. From the tank the fluid is discharged by a set of twin pumps through a pipe into a cylinder separator, 8 inches by 12 feet, within which are coils of pipe, and, by means of the proper heat, the crude material is removed, the oil fluid passing to the burner in the firebox of the boiler. The burners put in here are made to carry out the hot-air system. By this the burner is supplied with one-fifth steam and four-fifths hot air; a small jet of steam producing a vacuum in vacuum chamber, drawing a jet of air through the hot-air line over top of the burner, bringing steam and air together in the combination tube, there forming a vaporous gas, the result being a steady, diverging flame. There are three boilers here, aggregating 200 H. P. It is claimed they will evaporate sixteen pounds of water with one pound of oil and that the three boilers will require twenty barrels of oil per day.

The old Tennessee mill was destroyed by fire last year. The new one, of which W. J. Rickell will be Supt., will be started up next month. It is equipped for concentration, being provided with crushers, two sets of rolls, jigs, elevator, revolving screens and concentrating tables; the result will be jig and table products. The mill, if pushed to its full capacity, would handle about 150 tons of ore per twenty-four hours. The Tennessee ores consist of lead sulphides, the chief savings being lead, silver and gold. The mine is developed through two shafts, each 400 feet deep and both on the north and south ledge of ore. The vein, having fairly well defined granite and porphyry walls, is 10 feet wide in most places. One of the ore shoots has been opened for 250 feet longitudinally with the vein and to a height of 100 feet. The work runs 250 feet south of the shaft and 350 feet north of it. Drifts run at each 100-foot level. The two shafts are connected by underground work. A cage is operated in one and a bucket in the other. The high grades are shipped to the El Paso smelter; a sufficient tonnage of mill ore is on hand to keep the mill operating.

Adjoining the above property on the north is the Schuylkill group, controlled by F. W. Theis and associates. The group includes several claims, upon which there is considerable of open-cut and other development along the same vein as that of the Tennessee. An old shaft is being retimbered and preparations are made to sink a new shaft and erect a concentrating mill.

North of the Schuylkill, and inclining with it, is the Elkhart group, the property of the Security M. & Dev. Co. of London, T. B. Comstock of Los Angeles, Cal., being manager. After a close-down of several months, operations at the mine were resumed last winter, though the mill has not as yet been started. Oil burners under the boilers and oil tanks on the premises are likewise being provided here. The shortage of coal for steam uses has hindered the work and made the oil provision necessary. The main shaft, which is an incline, following the dip of the formation toward the west, is 475 feet deep; and as soon as power is better arranged for the work of sinking is to be commenced. The vein structure on all the levels, from the surface downward, shows a rather broken and irregular formation; and it is assumed that at greater depth the vein walls may become more regular and the ore body more concentrated. The underground work consists of levels on the vein, both directions from the shaft, from the first, second, third and fourth stations, with winzes, upraises and crosscuts, all aggregating about 4800 feet, besides a considerable amount of stoping from the third level upward. The work discloses an extensive shoot of ore, having a dip to the west, a north and south trend, but pitching northward on the strike. From this shoot a large tonnage of ore has been stoped, and there appears to be a considerable amount still exposed by present development. Work now in progress consists mainly in following stringers and crossveins of ore that possibly lead to important ore shoots in the wide, but more or less broken, mineral zone. The ores of the property comprise brassy iron pyrites in places and lead sulphides in others, the former carrying gold values. The bulk of production thus far, however, has been lead and silver. Dr. Comstock has laid out considerable work, both sinking and drifting, into unexplored ground to the northward. The concentrating mill, which seems in good condition, will doubtless be started later in the season.

South of the Tennessee is the Mollie Gibson, which belongs to Montana men. It is being developed by Laurence Harris, one of the interested parties. A 150-foot shaft is in a body of ore, some of which is said to have run as high as 70% lead, seventy-five ounces silver and $10 gold.

The properties above described are near the foot of the Cerbat range, following the north-south trend of the latter. Now the Minnesota and Conor, both in one group, are on a parallel zone, but considerably higher on the mountain slope. This is the property that was developed and operated for several years by John Barry, who sold it some time ago to the Philadelphia & Arizona M. Co., of which E. T. Loy is the manager. The group comprises sixteen claims, covering the north-south strike of a well-known mineral lead. There are four shafts, 240, 300, 200 and 100 feet deep respectively. The shafts are all connected on each 50-foot level. Here the vein walls are well defined, ranging in width from 5 to 40 feet. In many places the material between the walls is all pay ore, there being little waste. In other sections the ore is in narrow shoots. Here they have an iron and lead sulphide in the main, but in places accompanied by arsenical pyrites and zinc. The values are in gold, silver and lead. The iron sulphides are richer in gold, often running $100 to $200 to the ton. The high-grade lead shoots run as high as 40%. It is estimated that one-twentieth of the ore tonnage will warrant shipment to the smelter direct, the remainder or the great bulk of it being a concentrating ore that will run $15 to $20 per ton. A large tonnage of the latter class is blocked out. One feature of the mine is the presence, in considerable quantity, of native silver and argentite. In the construction of the 150-ton concentrating mill, which is to be erected within the next ninety days, it is proposed to put in pans and settlers, as well as jigs and tables, for the purpose of saving the native silver and such other values as are susceptible to amalgamation. Development work, in the form of sinking and drifting, is in progress. The same company owns the Merrimac mine and mill; the latter of ten stamps and three tables is operating on Minnesota ores. It is said the Merrimac mine is to be further developed.

The Lucky Boy is located 2 miles east of the Minnesota, near the crest of the range, at an altitude of 6200 feet. It belongs to T. B. Scott, of Chicago, and is in charge of F. H. Stull. The property is developed through two tunnels, one 88 feet above the other. The upper tunnel crosscuts 50 feet to the vein, thence drifting on the latter 400 feet. The lower tunnel crosscuts 265 feet to the first vein, continuing to a parallel vein, on both of which long drifts have been run. The upper and lower tunnels are connected and much of the vein matter between the two has been stoped out. The pay streak runs from 2 inches to 2½ feet. Near the breast of the lower tunnel a station is cut, making room for a whim, and there a shaft has been sunk 111 feet on the vein, and drifts are being run therefrom. The ore carries free gold near the surface, but it becomes a sulphide at greater depth. There are also rich streaks of native silver. The mine has been worked more or less for twelve years, but within the last year about 500 tons of ore have been sacked and shipped, same having run about $100 to the ton.

John Barry is developing the Sunlight and Tuckyho groups, on both of which he has fair prospects. WASCOTT.

Chloride, Feb. 27, 1901.

In the Granite Hill district, 70 miles southeast of Kingman, two claims were located some time ago, on which wolframite, or tungsten, has been found. It is known as the Davis & Haley property. The tungsten occurs within the walls of a quartz vein, in some places in narrow streaks in the quartz and in massive form at other points. Samples run 66% in tungstic acid.

Kingman, Feb. 23.

Mining and prospecting in the River range is attracting interest and some capital. This is sometimes called the Union Pass range. It trends north and south and is from 8 to 12 miles east of the Colorado river. The district becoming known as the Gold Road is on the east slope of the River range, 16 to 20 miles southeast of The Needles. It is near the old Beal stage road, which was formerly traveled from Prescott to Hardyville. The camp is now reached by wagon road from either The Needles, Cal., or Kingman, Ariz., men and supplies going in from both points. The Gold Road group, from which the district takes its name, was located by J. Jeres, who was grubstaked by H. Lovin of Kingman. They found free gold ore near the surface which ran from eighteen to forty-eight ounces gold to the ton. After very slight development they sold the group to Burkhart and associates of Los Angeles for $50,000, of which $30,000 has already been paid. The purchasers have developed the claims considerably and are said to have found ore running $30 per ton at 60 feet depth.

Near the Gold Road is the Smith & Koster group, recently bonded to O. F. Kuencer of Kingman, and by him sold to New York parties, the former retaining an interest.

The Treadwell group of ten claims is considerably developed, disclosing a vein 12 to 40 feet wide, carrying ore that runs $7 to $14 per ton.

The Leland group, in the same locality, is being developed through two tunnels, by which a rich shoot of ore has been opened. West & Bedell of The Needles are interested in this.

The ores generally, so far as disclosed by work, are free milling quartz, with apparently some streaks of sylvanite. At the Colorado river, west of the Gold Road camp, there is a mesquite flat from 1½ to 4 miles wide, the river banks being rather low. If production prove as now anticipated, a mill will be erected at this point on the river, where water is accessible.

Kingman, March 1.

Most of the work done at the White Hills is by leasers, who produce about ten tons per month of high-grade silver chlorides, which run an average of 700 ounces silver and one to three ounces gold to the ton, which, of course, is shipped direct to the smelters. The leasers also produce 150 to 200 tons mill ore per month, which averages 150 to 250 ounces silver and one to one and one-half ounces gold to the ton. The mill ore is handled by the White Hills mill, which is equipped with stamps, pans and settlers. The leasers work on the grounds of the White Hills M. & D. Co., who also operate the mill.

White Hills, Feb. 27.

PIMA COUNTY.

The bottom of the shaft in the Red Ray, in McGee Camp, in the Sierrita mountains, near Tucson, is 2½ feet wide; ore, 20% lead and some gold and silver; construction of mill will be pushed. A new road is to be built via the Sopori to Tucson.

PINAL COUNTY.

Work is in progress on the Haley-Souffrien lead properties in Mineral Creek district, near Florence.

YAVAPAI COUNTY.

The Senator mill, of twenty stamps, is preparing to start up to make a run of ore from the Senator mine, and it may continue after that for some time on copper ore from another property. The Senator belongs to the Copper Queen consolidation, of which Dr. J. S. Douglas is manager.

Prescott, March 1.

In Lynx Creek district there is not much work in progress except at the Mudhole mine, which belongs to the Penn G. M. Co. On this property is a well defined ledge of ore which dips at an angle of about 45° toward the south, the strike of the vein trending practically east and west. An incline shaft follows the dip of the vein to 500 feet depth, from which extensive drifting has been done at the 200, 300, 400 and 500-foot levels, with a large amount of stoping between the third and fourth. The width of the vein, as shown in the stopes, ranges from 5 to 15 feet, the gangue comprising a talcose and decomposed quartz material, which breaks down easily. The values, besides being found in the loose talcy material, are carried by a solid lead, iron and zinc sulphide, making a good concentrating ore. The hanging wall is porphyry and the foot wall granite. The stopes are timbered up freely with stulls. The concentrating mill is running about forty tons per day, reducing eight or ten tons of ore to one ton of concentrate. Additional machinery will be put in. The product is gold, silver and lead. Mr. Hascall is manager, A. L. Bell assayer and Frank W. Giroux mill superintendent.

Walker, Feb. 28.

The Jerome Power Co., interested in which are J. F. Mullin, H. J. Allen, W. C. Miller, E. J. Parkinson, D. J. Shea and E. H. Meek, all of Jerome, is pushing work on a project to construct 9 miles of canal, flume and pipe line to take water from Oak creek, which heads in the mountains near Flagstaff and empties into the Verde river southeast of Jerome. It is estimated 55 cubic feet of water per second will be taken from Oak creek; and 2 miles down from the intake the water line will be reinforced by about 20 cubic feet per second from a group of springs at that point. The profile of the work shows the line will cross ravines in several places, pass through cuts and tunnels in others. The water will be carried in open ditch most of the way, but through a flume and redwood pipe over part of the distance. Nine miles from the point of diversion the water will be dropped 266 feet through an iron penstock to four water wheels of 500 H. P. each; and at this point an electric power plant, comprising two generators, will be installed, the idea being to transmit electric power to the mines and smelters at Jerome and along the Black Hills range, which are from 12 to 14 miles from the point where the plant is to be put in. A force is at work on the ditch and it is expected that the water line and power plant will be completed this year.

Jerome, March 5.

R. H. Bruner of Big Bug is developing the Badger group, on the Agua Fria, 3 miles east of Huron. It comprises five claims, on which free milling ore is opened by cuts. The ore is in streaks and seams in the quartz.

The Rebel group at McCabe, which apparently is on the same ledge as that of the McCabe mine, has one shaft 400 feet deep, over which is a new steam hoisting plant. Another shaft, 200 feet deep, has a gosoline hoist. Both shafts are in a body of iron and copper sulphide ore, carrying gold values. This belongs to H. B. Clifford and associates. John Watterson is foreman and C. E. M. Beall superintendent.

At the lower end of Big Bug gulch, near the Henrietta, is the Cyprus, which belongs to Mayer, Thornton & Kingsley. They have a shaft 420 feet deep, on the vein, which trends east and west, ranging 3 to 4 feet wide. Drifting to the extent of 150 feet, and stoping, opens a body of copper sulphide ore, two cars of which were recently shipped that ran 23% copper and

$15 gold. They have five cars of first grade ore ready to ship.

T. W. Boggs of Big Bug is developing the Butternut group, whereon he has a 200-foot shaft, with some drifting. He states that 1000 tons of ore have been shipped which ran about 15% copper, $5 to $7 gold and a few ounces silver, all of which is carried in a black sulphide of copper.

The old Commercial smelter, between Big Bug and Mayer, belonging to the Commercial Mining & Smelting Co., is now idle, though it is said to be in good condition.

Up the Big Bug gulch, near the town of Providence, are the Sterling, Oriental, Providence, Red Rock and Belcher—the first two being located on the south side of the gulch and the others on the north side.

The Sterling group belongs to Youngstown, Ohio, people, and is temporarily closed down, except the working of a few men under the direction of James Breslin. The main shaft here is 425 feet deep, from which drifts on the first, second and fourth levels have been run 500, 225 and 150 feet, respectively, all going southward from the shaft. The drifts are all connected by winzes and upraises. A 400-foot tunnel has also been driven southward on the lead, at the terminus of which the ledge was cut off. A shaft is being sunk south of this break, in an endeavor to find the ore, having reached 125 feet depth. A shipment of 300 tons of ore was recently made to the smelter. The ore is copper and iron sulphide.

West of the Sterling is the Oriental group. The shaft and workings produce a large surfeit of water and the ores all the way down are considerably oxidized, carrying copper carbonates and free gold, with heavy streaks of black copper sulphides. The last named material has been the main cause of difficulty in concentration. The mill, which is not operating at present, ran 1600 tons of ore in 1900. Kent Bros., under whose management most of the development has been done, think the ores will have to be smelted direct, to avoid the loss in slimes in concentration.

The Red Rock—E. A. Powers superintendent and D. S. Bruner foreman—has a 300-foot shaft on a north and south vein, between syenite walls, ranging from 1 to 6 feet wide, carrying gold and copper ore in a sulphide form. There is approximately 3000 feet of drifting.

The Belcher joins the Red Rock on the north and extends in a group up toward the summit between McCabe and Big Bug gulches. This group covers an ore belt about 300 feet wide, trending north and south, within which are several parallel veins, this belt being bounded by syenite granite walls.

The Poland-Hamilton group, 4 miles west of Providence, belongs to the same people who own the Congress mine. The work here is in charge of J. Gray. The newer workings—on the south side—comprise three tunnels on the strike of the vein and a crosscut tunnel toward the main vein. The lowest is now in 445 feet on the vein; a second tunnel, 145 feet above the latter, is in 2700 feet, which connects with the Hamilton tunnel by a 100-foot upraise, the last-named being 338 feet long. The second, or Poland No. 2, connects with the Bell tunnel, 200 feet above it. The crosscut being driven below all the others, and now in 750 feet, is designed to cut through the mountain to the Lynx creek side, a distance of 6000 feet, and to serve as an avenue through which to carry all the ores to a prospective mill on the Big Bug side. This tunnel will give a depth of 800 feet. The vein here is 3 to 4 feet wide, has a slate hanging wall and a syenite foot wall. The ores are a lead, iron, copper and zinc sulphide, carrying values about as follows: Gold $14, silver sixteen ounces, lead 7%. It is a good concentrating ore. It is considered quite certain that the S. F. P. & P. R. R. will extend a brand from near Huron, up Big Bug gulch, via Providence, to the Poland-Hamilton group this season.

The summit between Big Bug gulch and Lynx creek at the Poland group is 6995 feet altitude, as shown by a stake of the U. S. Geological Survey.

Providence, Feb. 27. WASCOTT.

The Groom Creek district is 7 to 9 miles from Prescott and the center of a considerable amount of development and some production. The property best developed and equipped is that of the Empire G. M. & M. Co., of which Dr. W. A. Hendryx of Los Angeles is manager and S. S. Jones Supt. It comprises five claims in two contiguous groups, the one developed by a 700-foot tunnel on one vein and the other through a 340-shaft on another vein. On the tunnel drift there is claimed to be 10,000 tons of ore blocked out that may be milled. From the shaft about 500 feet of drifting has been done on each of the two main levels, with considerable stoping, showing a vein width of 2½ to 3 feet. There are well defined porphyry walls. The vein material is decomposed quartz, porphyry and talc, much of the ore being oxidized, which mills free gold. There are, however, frequent streaks and bunches of lead and iron sulphides. They estimate 30,000 tons of ore in sight between the surface and third level, and that about 3500 tons have been taken from the stopes. A 10-stamp mill on the ground is operating, fuel oil being used under the boilers, by which 45 H. P. is developed by twelve barrels of oil. In the mill a saving of 70% of the values is made by amalgamation, and 80% of the balance is saved by an application of cyanide. No concentrators are used. Capacity is forty tons per day, in which less than 1 miners' inch of water is used. It is so arranged that the water is used over and over again. The tailings from the battery are handled at a cost of 70 cents per ton; the final tailings, after treatment, are said to average less than 40 cents per ton. The mine values average about $11 per ton.

Sinking progresses in the main shaft. There appears to be four parallel veins on the property, from 250 to 300 feet apart.

The Home Run group, of which D. Moynahan is manager, has a new plant of hoisting machinery, with a shaft sunk 210 feet on a vein of ore, in which 150 feet of drifting has been done. The ore carries free gold, with some sulphides that carry gold and lead. The formation here dips toward the north and west; while the shaft is sunk on what seems to be the main vein, running N.E. and S.W., there appears to be some cross veins. If the showing continues the same as now, as development goes forward, a mill will be erected.

The Monte Cristo, under the management of Harrington Blauvelt, has a good hoisting plant and is sinking in a shaft 140 feet deep. There is 150 feet of drifting on the 100-foot level. The vein, which runs north and south, is about 2 feet in width and carries lead and iron sulphide, having gold, silver and lead values. There is found in this ore a considerable amount of wire silver attaching to the quartz and lead sulphides.

What is locally known as the Slack group is also being developed; it is partially equipped, having a small mill erected.

The Silver King, which has been idle for some time, may be started up soon by Mackin Bros., who have control of the property.

Groom Creek, Feb. 28.

The Richinbar mine, 16 miles southeast of Mayer station, on the Agua Fria river, was located some years ago by Geo. Zika, who still retains an interest in the property. The group was partially developed by the Hearst estate from 1896 to 1899, the equipment including a small mill and pipe line along the river for the development of water power to run a dynamo. Two years ago the property was acquired by Boston parties, since which time the operating concern has been known as the Zika Development, with G. W. Middleton, formerly of Colorado, as manager.

The holdings comprise a strip of ground 1800 feet wide, which extends about 6000 feet along the strike of a vein of quartz, standing almost vertically between syenite walls. The Agua Fria canyon, at this point 800 feet deep, cuts through the formation, showing the quartz vein exposed on both canyon walls. The holdings cover portions of the lead on both sides of the river. The surface of the country on both sides of the river here is a rocky, lava-covered, level plateau.

Under the present management the shaft has been sunk 250 feet deeper, to a total depth of 550 feet, and it is now planned to sink to 750 feet depth, which will reach a level below the river bed. Drifts on the vein have been run at each 100-foot station from the surface down. Recent work has opened the ore body on the fourth and fifth. The vein ranges in width from 6 feet to 40 feet, which carries shoots of ore in a schist gangue. The ore appears a quite free-milling gold quartz, though there are small streaks of iron sulphides. The values run as high as two ounces gold.

Manager Middleton states that there are about 5000 tons of ore on the dump, which has been produced incidentally to the development work; that thus far no stoping has been done. The matter of erecting a 100-ton mill, with crushers, rolls and concentrators, is being considered. At present a force of about thirty men is employed and about twenty-five tons of ore are being hoisted daily. The water in the Aqua Fria is of considerable volume at all seasons of the year.

Richinbar, Feb. 27. WASCOTT.

The Sundance mine and mill, now owned by the Reliance G. M. Co. of Chicago, is under the management of L. A. Davies at present. The property is temporarily closed down, pending some readjustment of company affairs. The group embraces ten claims, on which is about 3500 feet of underground work. The main shaft sinks 356 feet at the junction of two veins—one of which carries lead sulphide and the other iron sulphide. The values, in the main, are gold, silver and lead. The mill ran from August, 1900, to February, 1901. It is equipped with crushers, rolls, trommels, jigs and vanners, and, when operating, ran about thirty-five tons of ore per day, making a jig and table product of about ten tons per day. It is the intention to erect a wire-rope tramway, to convey ore from mine to mill, 1600 feet distant.

The mine is equipped with steam plant, for hoisting and mill work, and which also runs an air compressor for drill work. WASCOTT.

Prescott, Feb. 25.

YUMA COUNTY.

The first shipment of ore from Quartzite via the Colorado river was made on the 20th ult., eighty tons copper ore, from property of Jackson & Bondurant, near Quartzite.——The Beehive and Newhouse companies are sacking ore for shipment. ——The Orient group, near Quartzite, is sold to Chicago parties, who have organized the Golden Desert M. & M. Co., credited with intention to erect a 100-ton mill for treatment of its ore which is said to run $100 per ton.

CALIFORNIA.

AMADOR COUNTY.

Sinking is in progress on the Peerless, at Sutter Creek; when the 800-foot level is reached, crosscutting and drifting will begin.——The Argonaut, Sutter Creek, is being unwatered.——One hundred skips of water are being hoisted every twenty-four hours at the Kirkwood. Work is in progress, now being down 300 feet; crosscutting will begin soon.——The Eureka is now crushing fifty tons of ore daily.——The shaft at the South Eureka, at Jackson, Supt. Parks, is down 2000 feet. A station will be cut and a drift run on that level.——The westward drift from the east shaft of the Kennedy, Jackson, is in 325 feet.——Ore from the Price, near Plymouth, recently milled at the Bay State mill, shows $3 in free gold.——Work on the Duff Reeves claim, at south Plymouth, may soon be started by Eastern parties, who are now negotiating for a working option on the property.——Operations on the Bay State, 3½ miles north of Plymouth, will begin next month; W. W. Worthing, Pres. Bay State M. Co., is interesting Boston men in the property.——A new cable and sheave wheel are in place at the Oneida; sixty stamps are dropping steadily.——A 25-foot ledge of ore is reported opened up on the 400-foot level of the Fremont, near Drytown; Supt. Purrington.

BUTTE COUNTY.

The new mill recently put up on McCabe creek, near Hurleton, is running steadily.——An air compressor is going in at the Golden Trout. Twenty-five more men were put on recently.

CALAVERAS COUNTY.

At West Point the Farington G. M. Co. is pushing work on the Lone Star.——Operations on the Alpine, better known as the Batista, in Wet gulch, will resume. ——The tunnel in the Salvator (quartz), on the south side of Esperanza creek, in Mill Valley district, 4 miles from Jesus Maria, now in 150 feet, will be run an additional 20 feet to cut the main shoot of ore; H. C. Newman of San Francisco and E. H. Davison of Oakland owners.——Mauna Bros. and Gardella Bros. are pushing work on the Greenwood and Black Oak properties in Wet Gulch district——The ledge on the Pine Log, on Bear creek, near Valley Spring, is said to be 100 feet wide.——A new pump will go in at the Royal at Hodson.——The 4000-foot tunnel of the Melones M. Co. at Robinson's Ferry is completed. The vein matter is said to be rich in free gold and 100 feet wide.

The Mutual M. & M. Co. is pushing work on the Lucky Boy, near San Andreas. More men will be put on; B. Johnson Supt.

The two new turbines recently put in by the Utica Co. to run the Cross hoist, at Angels, were tested on the 3d inst. and found to work satisfactorily.

EL DORADO COUNTY.

The new hoist going in at the Springfield shaft of the Union, at Placerville, will have a capacity of going to the 3000-foot level. The shaft, now down 1600 feet, will be sunk to the 2200-foot level.——At Kelsey work is in progress on the Reese & Roelke; the tunnel is expected to reach the shaft shortly.——Ten men are employed at the Hart, near Placerville.

Water power will be used at the St. Clair at Kelsey, instead of steam. A pipe line will be put in.

The Cambrian, near Placerville, is shut down temporarily on account of water. A 350-foot tunnel is being driven to drain the mine, however.——Supt. Clark has men tearing down the old mill at the Church. A new mill will go in to replace it.——The mill at the Hart Con., near Garden Valley, is running; Jones & Roberts, operators. —— Operations on the Starlight, near Placerville, are under way and drifting is being done on the 600-foot level; J. Vance, Supt.——Work is resumed on the Mt. Pleasant.

Lane & Smart, operating the Shaw, near Placerville, have laid 4000 feet of 11-inch pipe to carry water to the mine, and cleaned out and enlarged the South Fork ditch to a capacity of 200 inches.——The Toll House M. Co. is pushing work on the Toll House (gravel), at Smith's Flat.

HUMBOLDT COUNTY.

At the annual meeting of the Trophy M. Co. in Eureka J. N. Adams was elected general manager.

KERN COUNTY.

The Randsburg Ore Sampling & Buying Co., General Manager Stagg, will put up sampling works at Johannesburg.——The work of rebuilding the new reservoir of the Yellow Aster Co. at Randsburg is completed.——The Century Oil Co., operating in Kern River district, is down 1017 feet, in black shale.——The McKittrick No. 2 is down 305 feet.——The Superior Development Co., operating on the southeast quarter of 24, 28-27, near Bakersfield, is spudding.——The well of the Clairmont Oil Co., operating on section 32, 28-28, Bakersfield, is down 350 feet.——The Electric Oil Co. recently struck oil sand at a depth of 300 feet on 10, 29-28, Bakersfield.——The Star Oil Co. of West Virginia, on 11, 30-21, Bakersfield, has put in a rig and will begin drilling operations shortly.——The Elona Oil Co. will begin operations on section 19, 28-28; L. A. Ross of San Francisco manager.——Well No. 4 of the Grace Oil Co. is down 450 feet.——The Globe Oil Co. is perforating its No. 5 well hole, is down 900 feet, and 600 feet of oil stands in the casing.——At Sunset the Raisin City Oil Co. on 31, 32-24 and Bennett & Stokes on 28, 32-24 are operating Canadian pole rigs. The well of the Raisin City Oil Co. is down 500 feet.

The county assessor has fixed the rate valuation on lands in the heart of the Kern River district at $1000 an acre. Possessory interests will be considered personal property.

The California Standard Oil Co. has its No. 3 well at McKittrick down 750 feet.

The well of the 20 Oil Co., at McKittrick, is down 220 feet; 9⅝ casing is going in.——The Empire Oil Co. will soon begin operations on the southwest quarter of 8, 30-22, near McKittrick.

MONO COUNTY.

In the Standard Con. mine, at Bodie, for week ending March 2, 418 tons of ore were crushed; average assay vanner tailings, $7.95; concentrates produced, 1.14 tons; assay value, $101.12; amalgam produced, 1190 ounces; value per ounce, $2.23.

Supt. Kermeen reports operations progressing favorably in the Castle Peak mines, near Bodie, but says that the mill will not be started up again till May 1st.

NEVADA COUNTY.

The new mill at the Lecompton, at Nevada City, will start in April.——Work is in progress on the new 10-stamp mill for the Campbell.

H. R. & R. D. Ogden, operating the Federal Loan, Willow, recently made a shipment of four tons of ore to the Selby Smelting & Lead Works, San Francisco. ——Work is resumed on the Independence, near Graniteville; C. M. Root, Supt.

Hartman & Graham are running a new tunnel in the old Odin (gravel), on Washington ridge, near Nevada City.——Good ore is coming out of the Providence. Fifty-three men are working. The mill is expected to be running to its full capacity shortly.

The Nevada County mill will run on ore from the Wyoming, near Nevada City, operated by Marsh Bros. and others.

PLACER COUNTY.

Operations are under way at the Pioneer, near Colfax; Supt. J. J. Sullivan.——A new tunnel is being run on the Central (quartz).——The Rawhide Con. M. Co. is running a new lower tunnel; two shifts are working.——Work is being pushed on the Morning Star, at Iowa Hill.

PLUMAS COUNTY.

The Jamison M. Co., operating near Johnsville, has fifty men employed.——Work is in progress in the Clay Bank tunnel, near La Porte.——An 8-foot tunnel drain will go in at the Thistle Shaft, near La Porte.

SAN BENITO COUNTY.

The Hollister Crude Oil Co. has a derrick up near Hollister.

SANTA CRUZ COUNTY.

The Watsonville Oil Co. is reported to have refused $300,000 for its leases near Watsonville.

SHASTA COUNTY.

A strike of rich ore is reported in the Hobo, in French Gulch district.

The North California Investment Co.,

operating the Black Diamond copper mine on Stillwater creek, Beda Becker manager, is driving a tunnel more than a mile long through the hill from both the western and Pitt river sides.

SIERRA COUNTY.

The Independence at Wolf Creek is bonded to Mr. Hall.

Supt. R. P. Mott is pushing work on the Mammoth Springs, east of Forest City. Twelve men are employed.

SOLANO COUNTY.

The Rochester Oil Co. will begin drilling for oil near Suisun.

SISKIYOU COUNTY.

The Helena (gold), in Callahans district, is producing forty tons of ore per day. Ore is crushed in the Kent mill, which has a capacity of forty tons daily; a cyanide department is added to the mill; Supt. McKeene. —— Seventeen men are employed in the Montezuma (gravel), near Callahans.——Mahler & Schroder will begin operations on the Drummer Boy (quartz), in Cherry Creek district.——Manager S. C. Matthews is pushing work on the Jordan (hydraulic), in Cecilville district, two giants being operated. It is expected to clean up $16,000 this season. ——Operations on the Junction (gravel), near Cecilville, are progressing under Supt. S. Conzeth.——The Halleck drift mine will hereafter be worked as a hydraulic mine.——It is reported that the Mt. Shasta M. Co. of Yreka may buy the Horton gulch placer mines, near Cecilville.——The Brown & George (placer), Cecilville district, is bonded for $2200.——Operations are progressing steadily at the Kem Lee (gravel), in Greenhorn district. ——Work will begin on the Ball (quartz), in Humbug district.——The Jordan (copper), in lower Klamath district, is reported bonded to a foreign company for $120,000. ——In Scott Valley district, the Helen Quartz M. Co. will soon begin work on its properties.——Work is under way at the Kunz Flat (hydraulic), in Hamburg district.

Repairs to the flume and ditch of the Siskiyou (hydraulic), on the Klamath river, near Hamburg, are completed.——The Golden Jubilee, at Humbug, is sold to L. W. Fanquier.——Operations are under way on the old Campbell or Oro Grande, Quartz Valley.

TRINITY COUNTY.

The Sykes M. Co. is getting the old Boss & McCleary, at Trinity Center, in shape for the spring run.——The buildings for the new mill and cyanide plant going in at the Headlight, near Carrville are nearing completion.——A strike of good ore was recently made on the Yellowstone, in New River district.

TUOLUMNE COUNTY.

The Bonanza, near Sonora, was recently sold at sheriff sale to J. Cain.——The Longfellow, at Big Oak Flat, and the Rhode Island, at Groveland, are running steadily.——A new 20-stamp mill is to go in on the Mack, at Big Oak Flat, Supt. C. L. Lang, but only ten stamps will go in this spring. —— The Mt. Jefferson, at Groveland, 20-stamp mill will start up —— The tunnel in the Over, near Columbia, is in 500 feet.——High-grade ore is reported opened up in the Mt. Lily.——The shaft at the Goldwin, near Carters, Supt. W. H. McClintock, will be sunk to the 400-foot level, at which depth drifting will be started; good progress is being made in construction of the new mill.

The tunnel in the Continental, near Columbia, is in 1000 feet.——There are 200 feet of water in the Rawhide at Rawhide. Unwatering of the mine is under way.

The Dutch M. & M. Co. has increased the capacity of its plant at Quartz.——Over 1000 feet of tunnel are run on the Continental, near Columbia, operated by C. B. Taylor.——The Golden Gate at Sonora will increase its stamps from twenty to thirty; the Shawmut at Jamestown will increase from sixty to one hundred; the Republican at Jacksonville will increase from ten to thirty.

Work is under way in the lower tunnel of the Mayflower, Carters.——The Kodak and Rising Sun mines, near Carters, are reported bonded to Los Angeles and San Francisco men for $12,000.

COLORADO.

CLEAR CREEK COUNTY.

The 2-mile tunnel now being run into Covade mountain, near Empire, by the Empire Tunnel Co., will serve as the main channel of drainage and transportation for about seventy-nine known claims; it will be double-tracked and equipped with a car system capable of handling material removed.

At Georgetown last week the Atlantic-Pacific Ry. tunnel and all of the mining and mill site property of the company was sold at public auction at the court house by Commissioner W. L. Dayton of Denver to satisfy judgments for over $700,000 secured by Mrs. Marie E. Hoyt, a bondholder. The entire property was bid in by J. E. Ratchford, a banker and capitalist of Syracuse, N. Y., for $4100. The tunnel is now in 5300 feet on the east end. The total length of the bore as originally outlined was 25,250 feet, but by changing the length has been shortened 7000 feet. It is expected that the tunnel will be completed in two and one-half years, and the distance from Denver to Leadville by railroad through the tunnel thus shortened over 100 miles. The tunnel was started originally in 1880 by "Brick" Pomeroy, and $700,000 has been spent in its construction.

The Stephens group, near Idaho Springs, is reported sold to the Golden Smelter Co. for $2,000,000. The company will build a large water power plant on Clear creek, 3 miles west of Idaho Springs, and will run a tunnel south to cut the veins at depths of from 1000 to 1800 feet below the apex of the hill. Work on the new smelter of the company is progressing satisfactorily; four boilers and one blower are already on the ground; 100 men are employed.

FREMONT COUNTY.

In contradiction to a recent statement that from $8 to $10 gold per ton was found in the slag from the Rocky Mountain smelter, at Florence, Supt. F. R. Carpenter states that the highest value obtained from an assay of the slag was 40 cents per ton and that, as a rule, it does not exceed 20 cents per ton.

GILPIN COUNTY.

The Colorado Supreme Court has before it the case of Cleary vs. Skiffich. The plaintiff bought some years ago a mill site claim, which was located in 1860 and on which many thousands of dollars had been expended. In 1895 Skiffich secured a lode claim on a property which apparently included the mill site claim already being worked. A litigation followed and the court below decided that a lode claim, no matter how long after the date of a mill site claim was taken out, had precedence. This is the first time this point has ever reached the Colorado Supreme Court.

The Town Topics G. M. Co., operating the East Notaway, near Central City, will retimber its shaft from the 360-foot level to the 560-foot level. Levels are being extended and ore is being shipped; a new addition to the ore house is built; M. D. Draper, manager.——E. W. Williams & Co., operating the Annie Mary and Pittsburg & Meeker properties, in Russell district, are extending the 300 and 400 foot levels of the Pittsburg & Meeker east and west.——The West Notaway M. Co. of Chicago, Ill., is taking out smelting ore from the 350-foot level of the West Notaway, near Central City; Supt., H. F. Pool.——The shaft in the National, at the head of Spring gulch, near Central City, operated by Lowe & Dines of Denver, is down 560 feet.——During February 264 cars, or 5284 tons, of ore were shipped from Black Hawk.——Supt. W. Job is pushing work on the Annex, in Lake district, near Central City.——The shaft in the Puzzle, on Gregory mountain, is down 410 feet. Thirty men are employed; W. H. Tripp, Supt.——Ore of smelting quality is reported at a depth of 550 feet in the O'Neil, on the summit of Gregory mountain, near Central City, operated by the Ontario-Colorado G. M. Co. Fifty men are employed.

The new broad, deep mortars recently put in the north section of the Gilpin 50-stamp mill, at Black Hawk, have proven a great improvement over those formerly used, and as a consequence five other batteries of same pattern will be put in.

GUNNISON COUNTY.

The Tomichi valley smelter, 3 miles below White Pine, will start up soon. The plant treats 1000 tons of ore per month, and is supplied by the North Star, Nest Egg, Eureka, Erie, Victor, Lily, Chicago and Pocahontas mines, in the Tomichi district; a new water jacket furnace will go in to replace one formerly used; R. H. Terhune, manager.

HINSDALE COUNTY.

The tunnel in the Golden Fleece, at Lake City, is in 2400 feet.

LAKE COUNTY.

Supt. R. Hahnewald is pushing work on the Hap Hazard, at Lake Park.

The Wolftone, at Leadville, is now shipping 100 tons of ore daily.

The Zang Brewing Co. of Denver, operating the Eclipse, at Leadville, will sink a new shaft on the property.——The new Printer Boy Co., operating the Printer Boy, will sink the old shaft, now down 850 feet, an additional 300 feet.——The old Carbonate Hill Co.'s property, which has lain idle for fifteen years, will be reopened; the old shaft is down 400 feet.——Operations on the Seeley shaft, on Poverty Flat, Leadville, will resume.

OURAY COUNTY.

A strike of rich ore was recently made in second level of the Newsboy, at Ouray; ore is reported to assay from 600 to 1000 ounces silver to the ton.

PARK COUNTY.

The Parker interest in the Tenderfoot, near O'Brien City, is taken over by G. Ritter and associates for $8000; two shifts will be put on and sinking of shaft continued.——The Electric Co., of Chicago, has bonded 160 acres land at Reynolds station, in 11-mile canyon; the company intends to put in a mill.

ROUTT COUNTY.

Work is progressing under Supt. A. O. Young.

SAGUACHE COUNTY.

A strike of ore running $358 to the ton is reported on Milwaukee hill, near Crestone ——A new track and car go in at the Banner tunnel, Crestone; a new air compressor and drills also go in soon; the tunnel will be pushed.

SAN JUAN COUNTY.

The Silver Ledge M. & M. Co., operating the Silver Ledge, near Silverton, will double the capacity of its mill and sink a 7x4 working shaft to a depth of 500 feet; at this depth 2000 feet of drifts, etc., will be run.

A mill will probably go in on the Aztec, in Needleton district this summer; Supt., J. Moore.——In the Mastodon the upper drift is in 360 feet and the lower drift is in 90 feet; fourteen men are employed.——E. Liston is pushing work on his group at the edge of Needle basin, 4 miles from Needleton.——The drift being run on the Waterfall vein of the Blunt property is expected to cut the Bluff vein at a depth of 250 feet.——The Colorado C. & G. M. Co., capital $1,000,000, is incorporated at Silverton.——Supt. C. E. McIntyre is pushing work on the Golden Fleece, in Picayune gulch, near Silverton.——W. D. Wells has begun work on the Magnet tunnel, near Burro bridge, Silverton.

SUMMIT COUNTY.

The Wilfley mine and mill, at Breckenridge, are running steadily; E. E. Byron, manager.——Good ore is coming out of the Breene, on Elk mountain, near Breckenridge.——Manager J. Groff is pushing work on the Reconstruction, on Copper mountain.——The Maximus is closed down, owing to bad condition of roads. ——The El Dorado, at Robinson, is being unwatered through the East shaft. Sinking is in progress on the Ten-Mile and Half Moon claims.

TELLER COUNTY.

The shaft on the Wrockloff lease of the Acacia Co., Cripple Creek, now down 625 feet, may be sunk an additional 300 feet to strike the Burns vein.——The Pointer, Cripple Creek, is shipping ore from the 525-foot level.——The Cripple Creek Gold Exp. Co. has begun work on the east shaft of the May Belle, now down 146 feet and will sink it to the 500-foot level. Below present level it will be a three-compartment shaft, and when 500-foot level is reached the upper portion will be widened to same dimensions.——The Union Bell M. Co. will sink its shaft to the 500-foot level. —— On Tenderfoot hill, Cripple Creek, the Bob Lee shaft, now down 200 feet, will go an additional 100 feet, at which depth drifting will be done.——New 300 H. P. boilers will go in at the Legal Tender. —— During February the Dead Pine, operated by J. W. Phillips, shipped 100 tons of ore from the 700-foot level.——A strike of good ore was recently made at the 527-foot mark in the tunnel of the Omega, on Gold hill, near Victor, operated by Carl & Morse.

The shaft on the Sundown, on Raven hill, Cripple Creek, is down 300 feet.——The Union Belle M. Co., operating on Gold hill, Cripple Creek, will put in a new steam hoisting plant, including a 25 H. P. boiler and a 4x8 hoist.——Standard & Co., operating block No. 3 of the Mountain Beauty, near Victor, have sunk the shaft to a depth of 150 feet; ore assays from $50 to $60 to the ton.——Berg, Buechner & Perkins, operating block No. 2 of the Deadwood, Victor, recently realized $2500 from a 10-ton shipment of ore; the crosscut now being driven on the 650-foot level is in about 70 feet; it is expected to cut the ledge within the next 30 or 40 feet.——The shaft on block No. 4 of the Kimberly, Cripple Creek, now down 175 feet, will be sunk to the 400-foot level; G. Bently, operator.——The Economic mill, at Cripple Creek, is being cleaned up preparatory to treating what is said to be the largest tonnage of ore in its history.

IDAHO.

BANNOCK COUNTY.

Mr. Cowan, owning 300 acres of placer ground near Pocatello, on the Snake river, recently made a test run of the gravel over the vanners at the Strawberry mill, at Pocatello, and it is stated that results were such that not a color was left in the tailings. He will put up a plant this spring, using several 6-foot vanners.

IDAHO COUNTY.

The second payment on the Blue Jacket, near Grangeville, $3500, is made. The new hoist put in last month, which is capable of going to a depth of 1000 feet, is running smoothly; drifting is in progress; twenty men are employed.

Operations on the Vesuvius, Buffalo Hump, will resume immediately; Supt. Stephens.

The second payment on the Blue Jacket, at Crooks Corral, amounting to $3833, is made.——A strike is reported on the Corson & Thompson property, in Crooks Corral district, of ore said to run $20 gold and 15% copper.

NEZ PERCES COUNTY.

The Grand Ronde Power Co., a branch of the Vineland Co., will build a power house 25 miles above Lewiston and 3 miles from the mouth of the Grand Ronde river this year; by conveying water of the river in a canal for several miles the company expects to develop 5000 H. P., to supply electric light and power to the quartz and placer mines in the Salmon River and other districts up Snake river.

A mill and reduction plant will go in on the Gold Point M. Co.'s property, in Red River district, near Lewiston, this summer; J. D. Boyer, Supt.

Ore running $69 to the ton is reported on the 250-foot level of the Silver King, on the Salmon river, 60 miles east of Warren.

OWYHEE COUNTY.

The Virtue Con. M. Co. of Montreal, Canada, owning and operating the Cumberland, on War Eagle mountain, near Silver City, has sixty men employed in mine and mill; resident manager, A. Buckbee.

SHOSHONE COUNTY.

The station being cut on the 160-foot level of the Amador, near Wallace, is completed.——As soon as roads are in condition the Mascot, at Orofino, will resume operations.

A strike is reported made on the Chester, near Osburn, owned by Weber Bros., Wentz and Fairweather.——The Terror Con. M. & M. Co., capital $100,000, is incorporated, to work the De Gourges, Jean Ribault and Mary Mann, near Osburn.

The Mascot M. Co., operating near Pierce City, will put in a new hoisting plant and sawmill.

The tunnel being run by the Sister M. Co., near Wallace, is in 300 feet.

MICHIGAN.

HOUGHTON COUNTY.

The Champion M. Co. will build a new mill on the Champion, at Houghton.——The Adventure, at Houghton, will put in three heads and necessary washing machinery; also, a new 60-drill air compressor.

The annual report of the Tamarack M. Co. (Lake copper producers) for year ending Dec. 31, 1900, shows:

	Revenues 1900.	Revenues 1899.
Receipts from copper	$3,299,077	$2,952,098
Costs of copper	2,099,935	2,211,588
Total	$1,199,142	$740,510

	1900.	1899.
Rock hoisted, tons	766,058	775,532
Rock stamped, tons	625,422	631,090
Cost of stamping ℔ ton	34.479c	22.727c
Mineral obtained, lbs.	31,738,405	31,713,752
Refined copper, lbs.	20,312,500	20,033,576

The actual cost of mining and treating rock was no less in 1900 than in 1899, but the increase $\frac{53}{1000}$ of 1% of fine copper in the rock stamped and the high price obtained for copper during 1900 permitted the raising of dividends from $10 in 1899 to $17 per share in 1900. The cost of producing copper in 1900 at the Tamarack works was 10 34 cents, against 11.05 cents in 1899 and 9.31 cents in 1898. The average selling price in the three years was 16.24, 14.76 and 11.9 cents per pound.

The annual report of the Atlantic M. Co., Houghton, for 1900 shows that the copper realized 16 4 cents per pound; the yield was 12.04 pounds per ton of ore crushed. The $130,000 steel dam, now being built, is expected to be completed this summer.

MONTANA.

DALY COUNTY.

At Helmville, Supt. Little is pushing work on his property; high-grade ore is being shipped.——It is said that a Cripple Creek, Colo., company will put in a customs 10-stamp mill at Helmville.——On the 8th inst. Gov. Toole signed the bill changing Powell county to Deerlodge, and what was formerly Deerlodge county to Daly.

FERGUS COUNTY.

On the Weatherwax, in Skunk gulch, near Yogo, ore which was formerly worked with an arrastra is now of a smelting quality.——Carter & Settler, operating near Yogo, have run a 140-foot tunnel;

vein is 6 feet wide.——The Christopher Columbo and Josephine claims, on the divide between Dry and Running Wolf creeks, near Yogo, are being worked by C. Lehman of Lewiston. Ore from the Christopher Columbo is silver-lead, running $28 to the ton. Two shafts, 80 and 50 feet deep, are sunk and a 700-foot tunnel is run. A diamond drill will be put in on the property this summer.——The Kendall property, in the North Moccasins, bonded to Campbell & Fitch for $450,000 till May 1st, is being developed.

GRANITE COUNTY.

A New York company will work property near the Granite, near Rumsey; a 200-foot tunnel will be run.

JEFFERSON COUNTY.

The Basin & Bay State M. Co., owning the Katie mine, concentrator and smelter, at Basin, will issue $300,000 worth of bonds in order to raise that amount of money to begin operations with this year. The concentrator has a capacity of 500 tons of ore daily, and the smelter has a capacity of 250 tons. Shaft on property is down 500 feet.——The Ada, at Basin, is to be sold to E. S. Brown and H. W. Carter, of Springfield, Mass.

The Ada, in Cataract district, bonded to Springfield parties for $180,000, will be taken over by them on the first payment of $50,000. Since last September $22,000 worth of ore has been taken out.

MADISON COUNTY.

The Lake Shore M. Co., driving crosscut tunnel near Sheridan, expects to cut the lead within the next 100 feet.——Thirty-five tons of ore were recently shipped from the Keynote, in Georgia gulch, near Sheridan, to the smelter at East Helena. The property is operated by Pritchett & Eastridge.——McQueeney & McIsaacs, of Butte, may lease the Green Castle, on upper Wisconsin creek, near Sheridan.——Another body of ore is reported opened up in the Toledo shaft.——Thompson & Wiseman, operating the Buckeye No. 1, at Brandon, are shipping ore.

The Old Joe 10-stamp mill, near Pony, operated by the Salt Lake M. & D. Co., recently made a ten days' run which netted $1500. ——Operations are under way on the Fourth of July group, near Pony; Supt. H. T. Bragdon.——A new air compressor and hoisting plant are in at the Chili at Sand Creek. The shaft will be sunk several hundred feet.——The Red Bluff at Red Bluff, 3 miles from Norris, now being operated by the Montana G. M. Co. of Canada, is being unwatered. A new compressor is in and plans are under way for the erection of a 100-ton reduction plant; G. D. B. Turner, manager.——The Red Chief M. Co. is pushing work on the Red Chief and Water Lode mines, 1 mile from the Red Bluff; Sherman & Schmidtell, managers.——Two men are working on the Revenue at Richmond Flats.

PARK COUNTY.

The Bear Gulch M. Co., operating the Legal Tender, at Bear Gulch, is pushing work on the property.——It is stated that about $500,000 have been taken from the Souwash, Bear Gulch, within the last two and a half years.

SILVER BOW COUNTY.

The Butte M. & Dev. Co., operating the Emma, at Butte, is putting in two additional 80 H. P. boilers and an engine with a capacity to go down 1200 feet; a safety cage and additional pumps will also go in shortly; good progress is being made in sinking the shaft, which will go to the 1000-foot level.

The annual report of the Boston & Montana C. & S. M. Co. of Butte for 1900 shows the following:

Gross receipts	$13,242,576
Montana expenses	$4,241,895
Eastern expenses	807,828
Total expenses	5,049,724
Net	$8,192,852

NEVADA.

EUREKA COUNTY.

During week ending March 8, following shipments of ore were made from mines at Eureka:

Mine.	Pounds.
Bullwhacker	71,670
Diamond	80,390
Eureka Con	176,200
Excelsior	39,600
Helen	5,480
Jackson	68,790
Richmond	226,290
Total	668,420

HUMBOLDT COUNTY.

A strike of rich ore is reported made in the Gold & Silver at Trinity, near Lovelock.——Work on the Numa at Trinity, owned by Mr. Elsworth of San Francisco, will be resumed.

LINCOLN COUNTY.

The Quartette M. Co., comprising Boston parties, have twenty-four mining claims, divided into three different groups, in the Searchlight district, with a 20-stamp mill, equipped with plates and concentrators, on the Colorado river, 12 miles distant. The mine and mill work is under the superintendence of Benjamin Macready. The three groups of claims are not contiguous, though separated from each other by only 2 to 3 miles. Developments are being carried on through four shafts, at present of depth of 377, 220, 200 and 100 feet respectively; also through a tunnel driven 500 feet. From each shaft various levels have been run, aggregating several hundred feet. The ores, in the main, comprise free-gold quartz, with streaks of lead and copper sulphides. The veins vary as to trend. Some of them, however, run parallel to each other. The power consists of an oil-burner engine at one shaft, an ordinary steam boiler and engine at another, with steam power at the mill. The mill started in six weeks ago, the capacity of which may be doubled the present season. The table tailings are being impounded with the idea of cyaniding them later on.

Searchlight, March 1.

STOREY COUNTY.

The Occidental Con. M. Co. will demand $127,292.25 damages of the Comstock Tunnel Co. Should payment be refused, it will bring suit for the recovery of that amount; $27,292.25 of the sum is the amount paid by the Occidental Con. M. Co. to the Comstock Tunnel Co. under contracts for running the Zadig drift on the tunnel level; the remaining $100,000 represents the damage alleged to have been sustained from preventing the Occidental Con. M. Co. from working in that drift.

WASHOE COUNTY.

A strike is reported made on the Bellmare property at Cottonwood, near Reno. The company is running a 1500-foot tuntel, which is expected to cut the ledge at a depth of 500 feet.

The Crown Prince and Jones & Kinkaid mines at Pyramid are sold to M. D. Young & Co. of New York for $40,000, to be paid in two years in two equal installments. The purchasers expect to begin work at once.

WHITE PINE COUNTY.

The final payment of $50,000 on the Chainman, at Ely, is made.——The Union Jack, in Osceola mining district, is reported sold to Butterfield G. M. & M. Co. for $6000.

NEW MEXICO.

COLFAX COUNTY.

A new pump and large gasoline engine are going in on the Denver placer property near Elizabethtown; Manager Walsh. ——The Reiling Co. will put in dredging machinery on its property near Elizabethtown.——The Montezuma Co. is working the Hardscrabble and Billie B. properties, near Elizabethtown.

LINCOLN COUNTY.

The Old Abe M. Co. is pushing work on its coal property near White Oaks.

OREGON.

BAKER COUNTY.

Good ore is being taken out of the Big Blue, near Pleasant Valley.

JACKSON COUNTY.

The hoisting and pumping station at the Ashland, near Ashland, is being changed to the 250-foot level.——The Granite Mountain M. Co., capital $40,000, is incorporated at Jacksonville.

JOSEPHINE COUNTY.

The McIntosh placers on Coyote and Wolf creeks, near Grants Pass, are being operated by G. B. Perelli.——The Victor, Jr., mine and 15-stamp mill near Grants Pass are running steadily; fifty men are employed, and monthly output is given at between $30,000 and $40,000.——Supt. A. Howland reports giants running steadily on the Davis (hydraulic) in Jump-off-Joe district.——W. H. Hampton, operating the Columbia, at Placer, reports mining operations active in that district, water being abundant.

UMATILLA COUNTY.

The Independence M. Co., capital $2,000,000, is incorporated to work claims near Mountain Home, 28 miles south of Pendleton.

SOUTH DAKOTA.

LAWRENCE COUNTY.

Comparison of processes now used in the Black Hills shows the following results:

Process.	Per ct. saved.
Amalgamation	75
Smelting	95
Chlorination	92
Cyaniding	80 to 92 gold 65 silver

It is estimated that a 100-ton per day cyanide plant can be erected in the Black Hills for about $27,000, the running expenses of which would be about as follows:

LABOR.

Two engineers, $3.50 per day	$ 7 00
Two firemen, $3 per day	6 00
Two crusher men, $3 per day	6 00
Two men on rolls, $3.50 per day	7 00
Two solution men, $3 per day	6 00
Four pulp men, $3 per day	12 00
One chemist, $5 per day	5 00
One assayer, $3.50 per day	3 50
One helper, $2.50 per day	2 50
Total	$55 00

The cost per ton of ore for treating would be:

Labor	$ 55
Cyanide	30
Coal	30
Zinc	10
Repairs	10
Incidentals	10
Total	$1 45

The Hidden Fortune and other claims near Lead, recently sold to Mayham, Stevenson & Shaw, of Denver, Colo., will be worked on a large scale by the new owners. A 400 foot three-compartment shaft will be sunk and a 400-foot crosscut east and west will be run at that depth. A 200-ton cyanide plant will be built at Belle Fourche, on the Fremont, Elkton & Missouri Valley railroad, 30 miles distant.

TEXAS.

EL PASO COUNTY.

Phelps, Dodge & Co. contemplate the erection of a smelter at El Paso.——Work on the new custom smelter of the Federal Copper Co., at El Paso, will soon begin.

UTAH.

BEAVER COUNTY.

Work on the Horn Silver, at Frisco, is under way under Manager Farnsworth.

BOX ELDER COUNTY.

The Century mill, at Park Valley, is running steadily, and regular shipments of bullion are being made.

JUAB COUNTY.

It is probable that the Joe Bowers M. Co., operating near Diamond, Tintic district, will pay off its indebtedness and begin work soon.——The Alaska M. Co., operating the Alaska, near Tintic, is drifting on the 450-foot level.——Crosscutting is under way on the 1000-foot level of the Ajax, at Tintic; Manager Weir.——The Shoebridge Bonanza M. Co., Tintic, is crosscutting on the 525-foot level of the Shoebridge-Bonanza.——The main incline in the Martha Washington will go to a depth of 700 feet; Supt., S. Baldwin.

The main working shaft in the Gemini, at Eureka, is down 1630 feet; a winze was recently sunk at a point 100 feet in on the 1600-foot level, and a drift is being run from bottom of same underneath main shaft.

Manager S. Bamberger reports ore from the Lower Mammoth at Tintic running 12% copper, twenty ounces silver and about $2 gold to the ton; good progress is being made in driving tunnel on 885-foot level and vein is expected to be cut within the next month.——Ore carrying copper, silver and gold is reported opened up on the 450-foot level of the Martha Washington, at Tintic.——The Argenta Cop. M. Co., capital $500,000, is incorporated to work the old Dana group, consisting of the June, Turk, Daisy, Eastern, Dewdrop and Marcus claims. The main shaft on the property is down 200 feet.

Another cave is opened in the Black Jack at Tintic on the 500-foot level.——The Stockton group and Lake View, Tintic, are reported sold to G. A. Robinson, representing the Tintic M. & D. Co., for $20,000.

The new mill at the May Day, Tintic, will operate in April.——Work is resumed on the Dagmar-Eureka, W. H. Moeller, Supt. The company has options on the Missouri Lass and Free Coinage, and is negotiating for the Revenue. ——The Home Rule and the Robert E. Lee claims, Tintic, are reported sold to the Little Chief M. Co., the former for $15,000, $2500 to be paid within one year, and vendors accept 2000 shares of Little Chief stock at 16 cents per share as earnest money, balance to be paid within two years.——The Godiva-Sioux Mountain M. Co. is incorporated to work the Uncle Sam-Godiva vein in the Smuggler ground. ——The Argenta Copper Co. is incorporated to work the Dana group of six claims, near the Dragon Iron, at head of Dragon Hollow, Tintic.

SALT LAKE COUNTY.

The Dewey mill, at Bingham, is closed down temporarily, owing to bad condition of roads; manager, R. Bemis. ——The Highland Boy smelter, at Bingham, is now treating about 500 tons of ore daily. During last week Supt. R. White shipped 240,400 pounds of copper, gold and silver bullion to Eastern refineries.

An additional battery of five stamps will be put in at the Butterfield mill at Bingham. ——The Copper Boy, Great Chief, Copper Queen, Copper Boy No. 2, Florence C., Gracie C. Fraction, Copper Queen No. 2, O. K. Fraction and East Extension of the Butte & Boston, near Bingham, are sold to the Bingham Copper Boy M. Co. ——The new Mingo smelter at Sandy is in operation.

Shipments of ore from Bingham last week were 994 tons.——The New England C. & G. M. Co., operating the Nast group, has decided to build a concentrator in Muddy gulch, below the Last Chance mill, this spring.

SUMMIT COUNTY.

Work on the Bogan group, at Park City, will begin; shaft, now down 590 feet, will be continued to the 800-foot level.——An assessment of ½ cent per share is levied by the East Valeo M. Co., to enable company to pay off its indebtedness and push work.——A new engine, boiler, air compressor, etc., will go in at the Quincy, and at the California.——Shipments of McGregor ore from the old Crescent mill dump, consisting of about 400 tons, to Canyon City, Colo., are completed.

TOOELE COUNTY.

Operations at the Overland, at Sunshine, are progressing satisfactorily; mill is treating 450 tons of ore daily; manager, G. A. Duncan.

The new 150-ton per day roasting plant of the Sacramento at Mercur is in operation.

The mill of the Con. Mercur M. Co., at Mercur, treated 2200 tons of ore during the month of February. The roasters, which were made out of the old Brown driers at a cost of about $5000, are now treating about 620 tons of sulphide ore daily, and the putting in of the three new Jackling roasters, which was contemplated some time ago, is indefinitely deferred.

G. B. Sessions, Supt. West Argent, at Stockton, reports galena ore on the 400-foot level which assays 20.5% lead and fifty-one ounces silver to the ton.

WASHINGTON COUNTY.

Thirty tons of copper bullion were recently shipped from the Dixie smelter at St. George, being the result of a fifteen days' run. Supt. Snyder will start another run.

WASHINGTON.

FERRY COUNTY.

The Wilmot group of ten claims, on Silver creek, near Keller, is sold to the Loraine Copper M. Co. of Hoquiam; work is under way and shipments of ore are expected to be made within three months.

It is reported that an offer of $375,000 was recently made for the Chico, at Republic.

Some of the ore opened up in the upraise being run from the second to the first level of the Morning Glory, at Republic, assays $1000 to the ton; Manager Tate.——The Wauconda tunnel, at Republic, now in 475 feet, is going ahead at the rate of 6 feet per day; Supt. Hedges. ——The shaft on the Clackamas, Republic, is down 75 feet, and sinking is progressing at the rate of 3 feet per day.——The 400-foot shaft in the Quilp, Republic, is completed and a station cut at that depth. Drifting is in progress on the 300-foot level; ledge is 8 feet wide and ore runs $30 to the ton; Supt. Crummer.

SPOKANE COUNTY.

The Diadem M. & M. Co., capital $12,500, is incorporated at Spokane.

STEVENS COUNTY.

Supt. M. Mitchell of the Eagle, at Chewelah, reports opening up of good silver-lead ore on 120-foot level, also that shipments of ore will be made as soon as roads will permit.

Ore running 30% lead and twenty-two ounces silver to the ton is found in the Anaconda, on Red Top mountain, near Colville. ——Operations on the Little Giant, in Pierre Lake district, near Colville, will resume shortly.——Operations are progressing satisfactorily at the Copper King, near Colville. ——The new pumps, hoists, etc., going in on the Gold Bug, near Colville, are about placed; Supt. F. W. Morris.

The first payment on the Acme group, near Kettle Falls, is made by the Northwest M. Co. of San Francisco. A 1300-foot tunnel will be run to tap the ledge at a depth of about 800 feet; manager, W. F. Stevens.

WYOMING.

CARBON COUNTY.

Operations on the property of the Beulah Copper M. Co., near Battle Lake, are begun; a tunnel will be run and work will be pushed; Supt., J. F. Ledbetter.

FREMONT COUNTY.

Asbestos is reported at foot of Rattle-

snake range of mountains, near Lost Cabin, showing a fiber 8 inches in length.

FOREIGN.

BRITISH COLUMBIA.

Reports from the Ymir, at Ymir, for February show the following: Number of stamps dropped, 80; number of hours run, 611; number of tons ore crushed, 4900; number of tons concentrates produced, 447; total receipts for bullion, $41,600; total operating expenses, $15,400; net profit, $26,200.——Ore running $12 to the ton is reported in the tunnel in the Ocean Wave at Ymir.——The Snowdrop (marble) on Sheep creek, 7 miles from Salmo, is reported sold to W. Shackleton and G. Simpson of Nelson.——Twenty-three tons of ore recently shipped from the Wilcox, at Ymir, returned $57 to the ton.——Work is begun on the new mill of the Enterprise, Ten Mile.

The Boxer group, consisting of the Boxer, Ophir, Monadnock Fraction, Neglected and St. Alice claims, at the head of Ten-mile creek, near Slocan, are bonded to L. A. Thurston, representing outside parties, for $40,000, for eighteen months.

MEXICO.

The Sulphur M. & Ry. Co. propose to build a smelter at Carbonera, Cerrillos district, San Luis Potosi. The company will make a specialty of the reduction of sulphurous ores and the treatment of the by-products.

SOUTH AFRICA.

The British government has authorized the Chamber of Mines at Johannesburg to start 350 stamps.

Commercial Paragraphs.

THE Hendrie & Bolthoff Mfg. & Supply Co., Denver, Colo., write that the recent fire destroyed only one of their six warehouses, and that there will be no delay in filling orders.

THE A. Van der Naillen School of Mining Engineering of San Francisco has been compelled to move from 933 Market St., on account of increased attendance, requiring enlarged facilities, and now occupies its own three-story building, 113 Fulton St., one block west of City Hall.

JEANESVILLE IRON WORKS Co. report now building for the Vindicator Gold Mining Co., at Independence, Colo., a compound condensing pump, 1200 feet direct lift, to be the highest direct lift in that State. The Jeanesville in the Ibex, Colo., mine is the next highest lift, 1100 feet. The Gower Syndicate, Black Hawk, Colo., has put in a Jeanesville 800 feet lift.

THE Robert Aitchison Perforated Metal Co. of Chicago report an excellent run of business. They have recently made shipments to Kentucky, Wisconsin, Utah, Nebraska and other States. Shipments cover material for railroads, agricultural implements, breweries and other industries. Among recent inquiries are some from Australia, Germany and the West Indies.

THE S. H. Supply Co., have bought and are now dismantling the milling plant of the Gold Brick Milling Co., at Ohio City, Colo. This was a 20-stamp, dry crushing, silver mill, using the amalgamating process after the ore was roasted and desulphurized. The mill was in operation about one year, the ore giving out and company troubles causing a suspension, after which it was purchased by the above firm who are constantly dismantling mills and buildings throughout the west.

WORK is progressing on addition, 90x 220 feet, to the James Leffel & Co. plant, Springfield, Ohio, to be built of brick and steel, and equipped with electrical cranes and new machines to enable them to supply the demand for their Samson wheels. These works will now give work for 300 men. The company has an order for a large pair of horizontal wheels from Minneapolis, to develop 3000 H. P.; and another contract for ten 68-inch Samson wheels from Michigan, for driving electrical machinery.

Trade Treatises.

Part 5, Vol. I, The Ericsson Series; illustrated treatise on transposition of wires; Ericsson Telephone Co., 296 Broadway, New York City.

No. 7, American Engineering Works, 204 Dearborn St., Chicago, Ill., describing machinery and supplies for mining, milling, smelting and concentration.

No. 23, the Victor turbine, of equal typographic merit and painstaking detail to that mentioned above, tables, diagrams, sectional views, statistics, references, etc. The Stilwell-Bierce & Smith-Vaile Co., Dayton, Ohio.

The 1901 catalogue, No. 13, of the Jackson hand power rock drill and equipment; finely illustrated description of the Jackson drill, with prices, and eight pages of testimonials from users. It is issued by H. D. Crippen, 52 Broadway, New York City; western office, 1756 Larimer St., Denver, Colo.

Section 2 of "Mining Machinery," a superb production, illustratively descriptive of concentrating machinery, mills and appliances, replete with up-to-date details, conveniently indexed and in every way valuable. The two engravings of Hartz jigs, on pages 250 and 251, are splendid specimens of the engraver's art. The Edward P. Allis Co., Milwaukee, Wis.

Personal.

J. H. HAMMOND is in Salt Lake, Utah.

J. B. TAYLOR of Salt Lake, Utah, is in Flagstaff, Ariz.

I. A. JACOBSON is appointed Supt. Ben Butler, Bingham, Utah.

J. A. CUNNINGHAM of Tintic, Utah, has returned there from the East.

A. B. HALL now has charge of the Mineral Hill property, Ballarat, Cal.

S. C. IRVING has been elected president Mechanics' Institute of San Francisco.

W. D. HAWLEY of Grass Valley, Cal., is now Supt. Rawhide mine, Rawhide, Cal.

E. L. LEAVER of Salt Lake, Utah, has returned there from Cripple Creek, Colo.

GEORGE KISLINGBURY is examining mining property in the State of Guerrero, Mexico.

C. H. BRUNNER of Fremont, Neb., is in Salt Lake, Utah; from there he goes to Oregon.

SUPT. T. R. GARNIER of the Osceola, Alleghany, Cal., has returned there from Los Angeles.

CHARLES M. SCHWAB, president of the United Steel Combine, gets $1,000,000 annual salary.

D. C. DEMAREST, manager Angels Iron Works, Angels, Cal., has returned from San Francisco.

J. F. TENER, general manager Duquesne M. & R. Co., Nogales, Ariz., is in Pittsburg, Pa.

PRES. J. G. JACOBS of the Copper Belt Ry., has returned to Bingham, Utah, from Los Angeles, Cal.

W. L. CLARK is Supt. Lowell & Arizona Copper Co., Bisbee, Arizona, vice F. C. Fenner, resigned.

D. I. NICKERSON, Supt. Butte & Boston, Republic, Wash., has returned there from Hailey, Idaho.

EDWIN E. CHASE, M. E., Denver, Colo., has removed from 509 Mining Exchange to 824 Equitable Bldg.

B. HOLDEN, managing director United States M. Co., Bingham, Utah, sails from Europe for this country on the 20th inst.

H. W. TURNER, U. S. G. S., has returned to San Francisco from a two months' exploration trip through Michoacan, Mexico.

WM. MAGENAU has left the employ of the Cia Minera de Penoles of Mapimi, Mexico, and is now engineer and assistant Supt. Columbus Lead Co., Esther, Mo.

J. G. BLACK of Dunedin, N. Z., who was at Angels, Cal., working on a plan to extract gold from sulphurets without the use of chlorine gas, at the Lightner plant there, returned this week to New Zealand.

PRES. G. A. RUSSELL of Springfield, Mass., Treasurer W. O. Day of same place, Secretary W. E. Colley of Providence, R. I., and Directors G. B. Holbrook and E. P. Chapin of Springfield, Mass., all of the Basin & Bay State M. & M. Co., are in Basin, Mont.

L. M. RICE of Seattle, Wash., is selecting the route and making the survey for an electric railway between the towns of Greenwood and Phœnix, B. C. It is intended that the road shall carry ore from the mines at Phœnix to the smelters at and near Greenwood, as well as for passenger traffic.

Notices of Recent Patents.

Among the patents recently obtained through Dewey, Strong & Co.'s SCIENTIFIC PRESS U. S. and Foreign Patent Agency, the following are worthy of special mention:

METHOD OF SHAPING SHEET METAL BY HYDRAULIC PRESSURE.—No. 669,279. March 5, 1901. C. H. Harrington, San Jose, Cal. Assignor to F. L. Argall and W. C. Anderson, same place.

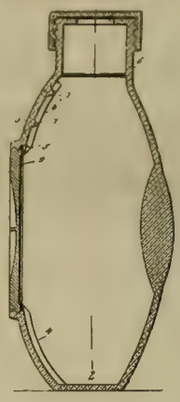
This invention is designed to utilize the well-known inelastic and mobile quality of liquids under pressure to form ductile, tensile or flexible material into any desired shape by means of molds, dies or formers, in contact with which the material to be shaped is placed and afterwards subjected to the heavy pressure or sudden impact transmitted through the body of water with which the parts are surrounded.

An Assaying Device.

The assaying device herewith illustrated may be made wholly or partly of glass; there should be sufficient part of it of glass to permit viewing the sand and metal therein.

The device comprises a bottle-shaped receiver having an oval outlet opening, a removable closure therefor, riffles at the inner side of one of the walls, a magnifying glass in the opposite side wall and a closure for an opening in the wall having the riffles.

In operation a small quantity of crushed ore or sand containing gold, etc., is placed in the device with a small quantity of water, whereupon, if side 3 be held downward, and the device rocked back and forth, it is designed that the heavy particles containing the gold or other values shall sink to the bottom, the water and sand to flow out at the open end. It is intended that the crushed ore or sand remaining therein in a moist state shall then be allowed to run down and evenly distribute over the smooth concave side, with the idea that particles of precious metal may then be easily distinguished by looking through the magnifying or plain glass. It is the belief of the inventor that "with the amount of sand known and the number of gold particles obtained, a fairly accurate idea may be formed of the value of the ore in free gold, and this may be repeated over different parts of the ground."



The inventor is Archibald Campbell, Surf, Cal.

List of U. S. Patents for Pacific Coast Inventors.

REPORTED BY DEWEY, STRONG & CO., PIONEER PATENT SOLICITORS FOR PACIFIC COAST.

FOR WEEK ENDING MARCH 5, 1901.

669,276.—MINING MACHINE—A. Allen, Spokane, Wash.
669,227.—TIRE TIGHTENER—C. A. & G. A. Anderson, Portland, Or.
669,210.—ICE LOCOMOTIVE—C. E. S. Burch, Seattle, Wash.
669,196.—VALVE—Chaplin & Falk, S. F.
669,137.—HAND STAMP—F. W. Dobbel, S. F.
669,198.—ADVERTISING DEVICE—Fowler, Owen & Metcalf, Seattle, Wash.
669,279.—SHAPING SHEET METAL—C. H. Harrington, San Jose, Cal.
669,460.—HAIR CURLER—A. Haug, S. F.
669,167.—ADDING MACHINE—A. Hoch, Alameda, Cal.
669,168.—ADDING MACHINE—A. Hoch, Alameda, Cal.
669,421.—FIRE EXTINGUISHER—G. J. Luce, S. F.
669,266.—DUMB WAITER STOP—Pierce & McMahon, S. F.
669,431.—GATE—J. R. Scrafford, Corvallis, Or.
669,189.—GAS BURNER—A. C. Swain, S. F.
669,374.—GAME—C. W. Tarbet, Goldendale, Wash.
669,451.—CITHERNS—W. A. Thaldorf, New Whatcom, Wash.
31,156.—DESIGN—W. F. Schmidt, Blanco, Cal.

Recently Declared Mining Dividends.

	Payable.
Arizona Copper Co., Arizona, $1.25 per share	March 7
United States Marble Co., Wash., ¼ cent per share, $3750	March 15
Ground Hog M. Co., Colo., 4%	March 15
New York & Honduras Rosario M. Co., Central America, 10 cents per share, $15,000	March 15
Daly-West M. Co., Utah, 30 cents per share, $45,000	March 15

Latest Market Reports.

SAN FRANCISCO, March 14, 1901.

SILVER—Per oz., Troy: London, 28 3/16d (standard ounce, 925 fine); New York, bar silver, 61½c (1000 fine); San Francisco, 61½c; Mexican dollars, 50c.

COPPER.—New York: Lake, 1 to 3 casks, $17.25; carload lots, $17.00; Electrolytic, 1 to 3 casks, $16.75; carload lots, $16.50; Casting, 1 to 3 casks, $16.65; carload lots, 16.50. San Francisco: 18. Mill copper plates, 20c; bars, 22@23c.

LEAD.—New York, $4.37½; Salt Lake City, $4.00; St. Louis, $4.20; San Francisco $5.00, carload lots; 5½c 1000 to 4000 lbs.; pipe 6¾, sheet 7½, bar 6c; pig, $4.70 @5.10. London, £13 15s per ton=3 cts. per lb.

SPELTER. — New York, $4.00; St. Louis, $3.50; London, £17 per ton=3.7 cts. per lb; San Francisco, ton lots, 5¼c; 100-lb lots, 6c.

ANTIMONY.—New York, Cookson's, 10c; Hallett's, 9⅝c; San Francisco, 1000-lb lots, 12c; 300 to 500 lbs., 13@14c; 100-lb lots, 15@18c.

IRON.—Pittsburg, Bessemer pig, $15.00; gray forge, $14.25; San Francisco, bar, per lb., 2.65c in small quantities.

STEEL.—Bessemer billets, Pittsburg, $21.75; open hearth billets, $25.00; San Francisco, bar, 7c to 12c per lb.

TIN.—New York, pig, $26.50; San Francisco, ton lots, 29c; 1000 lbs., 29½c; 500 lbs., 29½c; less, 30c; bar tin, ℔ lb, 35c.

QUICKSILVER. — New York, $51.00 large lots; London, £9 2s 6d; San Francisco, local, $47.50 ℔ flask of 76½ lbs.; Export, $45.00

MAGNESIUM.—New York, $2.90 ℔ lb.; San Francisco, $3.75.

ZINC.—San Francisco, 5¼c; slab, 5¾c; bar, 7c; zinc dust, N. Y., 8c.

BABBITT METAL.— San Francisco, No. 1, 10c.

SOLDER. — Half-and-half, 100-lb. lots, 18½c; San Francisco, Plumbers', 100-lb. lots, 15½c.

ASSAY LITHARGE.—San Francisco, 10c ℔ lb, small lots.

BISMUTH.—New York, ℔ lb., $2.25 50-lb lots; San Francisco, $2.50 to $2.75 lb lots.

PLATINUM.—San Francisco, crude, $17 ℔ oz.; New York, $18.20 per Troy oz

ALUMINUM.—New York, No. 1, 99% pure ingots, 35c; No. 2, 90%, 30c to 35c.

FERRO-MANGANESE. — Pittsburg, 80%, domestic, $62.50, large lots.

TUNGSTEN.—New York, ℔ lb., 95c; San Francisco, $1.15.

FERRO-TUNGSTEN. — New York, 37%, 32c; San Francisco, 65c (60%).

NICKEL.—New York, 50@60c ℔ lb.

PHOSPHORUS. — F. o. b. New York 50@60c ℔ lb.

POWDER.—F. o. b. San Francisco: No. 1. 70% nitro-glycerine, per lb., in carload lots, 15½c; less than one ton, 17½c. No. 1*, 60%, carload lots, 13½c; less than one ton, 15½c. No. 1** 50%, carload lots, 11¾c; less than one ton, 13¾c. No. 2, 40%, carload lots, 10c; less than one ton, 12c. No. 2* 35%, carload lots, 9½c; less than one ton, 11½c. No. 2** 30% carload lots, 9c; less than one ton, 11c. Black blasting powder in carload lots, minimum car 728 kegs, $1.50 per keg; less car lots, $2 per keg.

CAPS.—3x, $5.50 per 1000; 4x, $6.50; 5x, $8; Lion, $9, in lots not less than 1000.

FUSE.—Triple tape, $3.60 per 1000 feet; double tape, $3.00; single tape, $2.65; Hemp, $2.10; Cement No. 2, $3.00; Cement No. 1, $2.65, in lots of 3000 feet and up.

CANDLES.—Granite 6s, 16 oz., 40s., 11½c ℔ set; 14 oz., 40s., 10c.

CHEMICALS.—Cyanide of potassium, 98%-99%, jobbing, 32½@33½c ℔ lb.; carloads, 30@31c; in 10-lb. tins, 40c; sulphuric acid, in carboys, 66% B, 2c ℔ lb.; soda ash, $1.90 ℔ 100 lbs. 58%; hyposulphite of soda, 2¾@3c ℔ lb.; blue vitriol, 5¾@6½c ℔ lb.; borax, concentrated, 7@8c ℔ lb.; chlorate of potash, 12@13c; roll sulphur, 6c; alum, $1.90@2.00; flour sulphur, French, 2¼@ 2½c; California refined, 1¾@ 2c; nitric acid, in carboys, 8c ℔ lb.; caustic soda, in drums, 3@4c ℔ lb.; Cal. s. soda, bbls., $1.00; sks, 95c ℔ 100 lbs.; chloride of lime, spot, $2.50@2.60; nitrate of potash, in kegs, 8c; caustic potash. 10c in 40-lb. tins.

COAL. — San Francisco, coast, yard prices: Wellington, $9; Seattle, $7.00; Coos Bay, $5.50; Southfield, $9.00. Cargo lots, Eastern and foreign: Wallsend, $8.00; Brymbo, $7.50; Pennsylvania, hd., $14.00; Scotch, $8; Cumberland, $12; Cannel, $9.50; Welsh Anthracite, $12.00; Rock Springs, $8.50; Colorado Anthracite, $14.50. Coke, $16 per ton in bulk; $18 in sacks.

OILS.—Linseed, pure, boiled, bbl., 75c; cs., 80c; raw, bbl., 73c; cs., 78c. Deodorized Stove Gasoline, bulk, 14½c; do., cs., 20½c; 86° Gasoline, bulk, 20c; do., cs., 26c; 63° Naphtha or Benzine, deodorized, in bulk, per gal., 13½c; do., in cs., 19½c; Lard Oil, Extra Winter Strained, bbl., 75c; cs., 80c; No. 1 bbl., 50c; cs., 55c. Neatsfoot Oil, coopers' bbls., 60c; cs., 65c; No. 1 bbl., 50@52½c; cs., 55@57½c.

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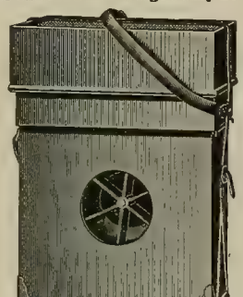

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FOR SALE.

FOR SALE.
ONE COMPLETE PLACER MINING DREDGE
OF THE ELEVATOR TYPE.

With buckets having capacity of seven and a half cubic feet. Dredge only used few months. Located on Grasshopper creek, near Bannack, Mont. For full particulars, address THE BUCYRUS COMPANY, South Milwaukee, Wis.

MACHINERY BARGAINS.

I have some splendid Air Compressors, Hoisting Engines, Rock Drills, Rock Crushers, Channeling Machines, Steam Pumps, Boilers, Steam Shovels, Locomotives and Relaying Rails, all in splendid condition. Send for printed list and specify your requirements. I can save you money.

WILLIS SHAW,
627 New York Life Bldg., CHICAGO.

FOR SALE.

A

20-Stamp Mill.

Strictly Modern.
Little Used.

Built by Fraser & Chalmers.

ANY PART OF THIS MILL WILL BE SOLD.

This 20-stamp mill is located at Ohio City, about 25 miles east of Gunnison, Colorado. We are dismantling this mill for shipment to Denver and will quote prices on any part of the mill f. o. b. cars Ohio City, Colorado, and guarantee to make prompt shipment. The construction of the mill was of the best, both in machinery and buildings. The total cost of machinery and buildings, which we have bought, was $130,000.00. Why was it sold? Simply another case of a mill without a mine. All correspondence should be addressed to our Denver office.

20 STAMPS. 850-lb. rapid drop, complete with frames.
2 BOILERS, 44 in. x 12 ft.; 30 3½ in. flues.
2 BOILERS, 44 in. x 12 ft; 34 3 in. flues.
(Boilers are set in batteries of two, half fronts, two stacks.)
CORLISS ENGINE, Fraser & Chalmers, 175 H. P.; cylinders 18x42 in.
FEED WATER HEATER, 30 in. x 9 ft. (F. & C.)
NO. 5 KNOWLES PUMP, 7x4½x10.
NO. 3 KNOWLES PUMP, 5x3¼x7.
BLAKE CRUSHER, 7x10.
6 AMALGAMATING PANS, 5x4 ft.
3 SETTLERS, 8x3 ft. 4 in.
1 CLEANUP PAN.
4 QUICK FEEDERS.
3 AMALGAM SAFES.
1 AMALGAM CAR.
2 MEECH SYNDIACTORS, new.
2 MEECH AMALGAMATORS.
3 MEECH SETTLERS.
HOWELL IMPROVED WHITE ROASTING FURNACE, 60 in. x 27 ft.
BANCROFT PULVERIZER, 40-ton.
REVOLVING ORE DRYER (F. & C.), 42 in. x 18 ft.
6 AUTOMATIC ORE FEEDERS.
1 RETORT AND BULLION FURNACE.
EXTRA STAMP AND FEEDER REPAIRS.
250 FT. SHAFTING, 4 7-16, 3 15-16, 2 15-16 dia.
1200 FT. RUBBER BELTING, 18, 16, 14, 12, 10, 6 and 4 in. widths.
4 CONVEYOR BELTS, with buckets attached.
50 IRON PULLEYS, BOXES, AND HANGERS.
10-TON FAIRBANK WAGON SCALE.
3000-LB. FAIRBANK DORMANT SCALE.
WOOD TANK, 8x8x3 FT.; IRON TANK, 6x6 FT.
1000 IRON PIPE FITTINGS AND VALVES.
40 000 FT. WROUGHT IRON PIPE.
SMALL TOOLS, ASSAY MATERIAL, SAMPLING MATERIAL, INCLUDING NO. 2 MILL, OILS, GREASE, CEMENT, Etc., Etc.

The mills contain about 200,000 feet of LUMBER. They will be sold as they stand, or f. o. b. cars. They have got to be taken down.

We have other Mills: Concentrating, Stamp, Cyanide, Reduction Works, etc., etc.

ADDRESS CORRESPONDENCE TO

THE S. H. SUPPLY CO.,
22d and Larimer Streets,
DENVER, COLORADO.

FOR SALE.

C E ENGINEERS PURCHASING & FORWARDING AGENTS B Co.

Six FIVE FOOT Huntington Mills

TOGETHER WITH NECESSARY

CRUSHING AND POWER PLANT.

Will Be Sold as Separate Items or Entire Mill.

PRESENT LOCATION: NEAR DEADWOOD, SOUTH DAKOTA.

Used Less Than Three Months. Guaranteed in Splendid Condition.

WILL NAME PRICES F. O. B. DEADWOOD, CHICAGO, OR DELIVERED AS DESIRED.

SPECIFICATIONS (Condensed).

6 ORE GATES, 24 x 38, rack, hand wheel, frames, bolts, complete.
2 ORE BINS, all necessary bolts, rods, nuts and washers.
2 GRIZZLEYS, 4′ x 10′, 1″ openings.
6 CHALLENGE AUTOMATIC ORE FEEDERS, including hoppers, wood frame, shafts and pulleys.
6 HUNTINGTON CENTRIFUGAL ROLLER MILLS, 5′ diameter, all fixtures and fittings, complete with wooden frame, shafts, pulleys and gearing.
6 COPPER TABLES, 6′ x 12′, ⅛″ copper, electroplated 1 oz. of silver per square foot.
2 AMALGAM SAFES.
1 BELT TIGHTENER, complete with pulley, boxes, etc., for main belt.
1 BELT TIGHTENER, complete with pulley, boxes, etc., for crusher.
1 CORLISS ENGINE, built by Fraser & Chalmers, cylinder 20″ diameter by 48″ stroke, complete in every particular, shaft 10″ in diameter, band flywheel 16′ diameter, 30″ face; weight, 42,000 pounds.
3 HORIZONTAL TUBULAR BOILERS, 54″ diameter, 16′ long, complete with steam drums 30″ x 72″, mud drums 18″ x 66″ for each boiler, breechings, smoke box, stack 48″ diameter 60′ long, all necessary guy rope, half arch fronts, grate bars, cast and wrought iron parts necessary for setting, feed, blow off check and safety valves, gauges and all fittings. Weight, 51,000 lbs. At present these boilers are arranged for setting in one battery. We will make any changes required, furnishing stacks and other items necessary to set each boiler separately.
1 HEATER, tubular, 30″ diameter, complete, with exhaust pipe.
2 NO. 5 KNOWLES BOILER FEED PUMPS.
1 BERRYMAN HEATER, 18″ diameter by 7′ long, copper tubes, 4″ pipe inlet and outlet.
1 HOOKER VERTICAL SINKING PUMP, 14x8x14, 6″ suction 5″ discharge.
8 ORE CARS, one ton capacity each.
1 WATER WHEEL, 50 H. P.
1 16″ BULLION FURNACE, complete, including 10″ Gold Retort, stack and all iron work.
1 NO. 5 STYLE B GATES FINE CRUSHER.
1 LOT REPAIR PARTS FOR HUNTINGTON MILLS, including roller shells, ring dies, scraper bars, shoes, screens, clamping plates, all new, never used.
1 LARGE LOT OF PIPE AND FITTINGS.
1 LOT BOLTS, WASHERS, RIVETS AND NUTS.
1 LOT OF MISCELLANEOUS SHAFTING, PULLEYS, PILLOW BLOCKS, HANGERS, ETC.
120′ RUBBER BELTING, 28″, 6-ply.
58′ RUBBER BELTING, 18″, 4-ply.
150′ RUBBER BELTING, 16″, 4-ply.
70′ RUBBER BELTING, 14″, 4-ply.
2 LOCOMOTIVES, 20″ gauge, built by H. K. Porter Co., Pittsburgh, one 6x10 cylinders, the other 8x14 cylinders, both saddle tank.

FOR FULL INFORMATION AND PRICES, APPLY TO : : :

CHAS. E. BILLIN & CO.,
1543 Marquette Building,
All Offers Subject to Previous Sale. CHICAGO, ILL.

Notice of Removal.

On or About MARCH 15th

NEXT, THE

JUSTINIAN CAIRE COMPANY

WILL REMOVE THEIR STOCK OF

Assayers' Materials, Chemicals and Mill Screens

To Their NEW BUILDING at

565-567 MARKET STREET,
SAN FRANCISCO, CAL.

IF IT CAN BE MADE

—OF—

PLATINUM

YOU CAN GET IT FROM

BAKER & CO.,

408 N. J. R. R. Ave., Newark, N. J.
New York Office, 120 Liberty St.

If interested, write for our "Data" concerning Platinum. We buy Scrap Platinum.

THE KLONDIKE OF ARIZONA.

THE

Prescott & Eastern Railroad

ENTERS AN

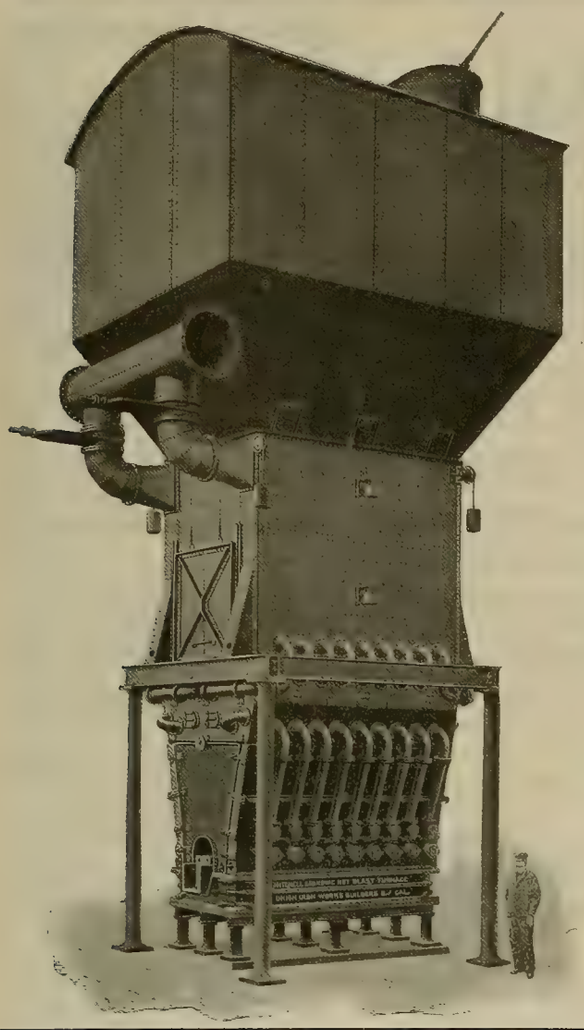
Extremely Rich Mining Country.

The opening of this road makes easy of access one of the richest Gold and Copper Mining Districts in the World. Hundreds of prospectors are turning their attention to this section.

Take the Santa Fe System to Ash Fork, thence via the SANTA FE, PRESCOTT & PHŒNIX RY. TO PRESCOTT.

For further information, address any Santa Fe Route Agent, or

H. P. ANEWALT, Gen. Pass. Agt., Prescott, Ariz.



UNION IRON WORKS,

222 MARKET ST., SAN FRANCISCO, CAL.

Hot Blast Water Jacket Furnace.

The picture shows the latest type of Economic Hot Blast Water Jacket Mitchell Furnace, built for the Copper Queen Consolidated Mining Company of Arizona. This furnace is adapted to reduce at one operation raw copper sulphide ores to a matte suitable for bessemerizing, without preliminary roasting.

UNION IRON WORKS,
222 MARKET STREET,
SAN FRANCISCO, CAL.

"THE DANIEL BEST"

50-Horse Power Traction Engine.

Freight carrying capacity of wagons, 16 TONS EACH, or a total capacity of train, 48 TONS.

CAPACITY OF ENGINE, 50-Horse Power.

Over One Hundred of these Powerful Engines in use on this Coast in the principal Logging and Lumbering Camps and for general freighting purposes.

EVERY ONE A SUCCESS AND MONEY MAKERS.

These outfits are particularly adapted to haul freight of any description from out-of-the-way places, and will reduce the cost of transportation at least one-half and in many instances two-thirds. They can generally be worked where animal teams now do the work, and haul their immense loads of from thirty to fifty tons, ascending and descending grades as much as 5 per cent to 30 per cent, depending upon condition of the road; loads may be increased to even greater amount on a firm and moderately level road.

Send for Descriptive Circulars and Price List. Wagons are built which are best suited for the kind of freight to be handled.

Estimates made for complete Steam Freighting Outfits. Address

THE BEST MANUFACTURING COMPANY,
San Leandro, California.

RISDON IRON WORKS.

SAN FRANCISCO, CALIFORNIA.

Cable: "Risdon's." Code: A. B. C. & Leiber's.

MANUFACTURERS OF

Gold Dredging Machinery

And COMPLETE EQUIPMENT for Placer Mines OUR SPECIALTY.

—WE BUILD—

GOLD DREDGES Complete in Running Order

to handle 2500 cubic yards per day at a cost of 3 cents per cubic yard.
We excavate 50 feet below water, 20 feet above water and handle boulders up to one ton weight.

SEND FOR DREDGING CATALOGUE NO. 17.

—WE ALSO BUILD—

ALL KINDS OF

Mining, Milling, Concentrating, Pumping, Air Compressing, Hydraulic, Water Wheel, and Hoisting Machinery.

Evans Hydraulic Gravel Elevators.

We publish sixteen catalogues. Write for one in the line you are interested in.

All sizes of Steel Water Pipe for City and Town Supply, Placer, Hydraulic and Quartz Mining. Cut, punched and rolled to be riveted at destination or made up complete.

We make a specialty of all kinds of Heavy Sheet Iron and Steel Work. Plans and Estimates furnished.

Showing Drum Attachment for Snaking Logs. The ONLY SUCCESSFUL ENGINE; works where others fail.

HOLT BROS.

Traction Engine

For Freighting and Logging.

50-HORSE POWER. CYLINDER 11 x 12. MAIN WHEELS 24″ x 7′ 6″.

FOR FULL PARTICULARS, ADDRESS

The Holt Manufacturing Company,

BUILDERS OF

Combined Harvesters, Traction Engines, Carriage and Wagon Wheels, Etc.

STOCKTON, CALIFORNIA, U. S. A.

Represented by HOLT BROS. CO., 30 & 32 Main St., San Francisco, Cal.

Branch Office, Walla Walla, Wash.

SELBY SMELTING AND LEAD CO.,

REFINERS OF GOLD AND SILVER BARS, GOLD DUST, ETC.

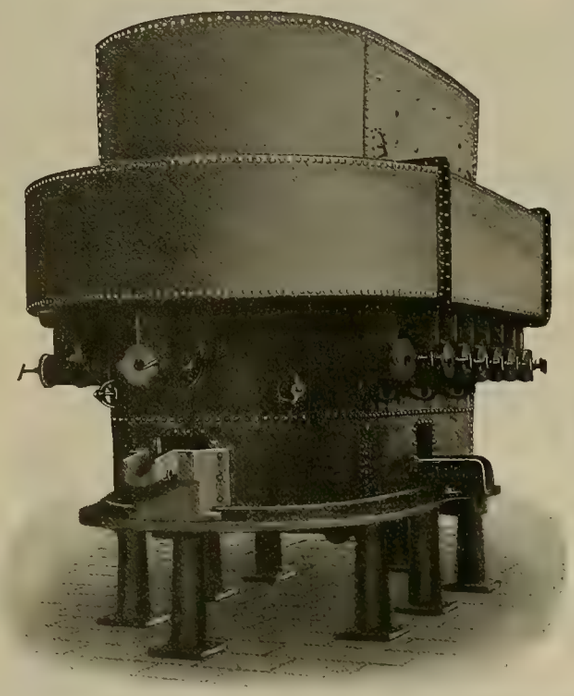
Buyers of Gold, Silver, Lead and Copper Ores, Gold Concentrates, Lead Bullion, Cyanide Product, Etc.

ORE AND BULLION ASSAYERS.

Works at VALLEJO JUNCTION, CAL. Office, 416 MONTGOMERY ST., SAN FRANCISCO, CAL.

CATES IRON WORKS

MINING MACHINERY.



WE BUILD THE FOLLOWING:

Smelting Furnaces of every class.
Converters and accessories.
Round Furnaces.
Rectangular Furnaces.
Lead Furnaces.
Copper Furnaces.
Wrought Iron or Steel Jackets.
Cast Iron Jackets.
Fore Hearths.
Settling Pots.
Slag Pots.
Reverberatory Furnaces.
Cupelling Furnaces.

Main Office and Works, 650 Elston Ave., Chicago.

NEW YORK OFFICE, 11 BROADWAY.

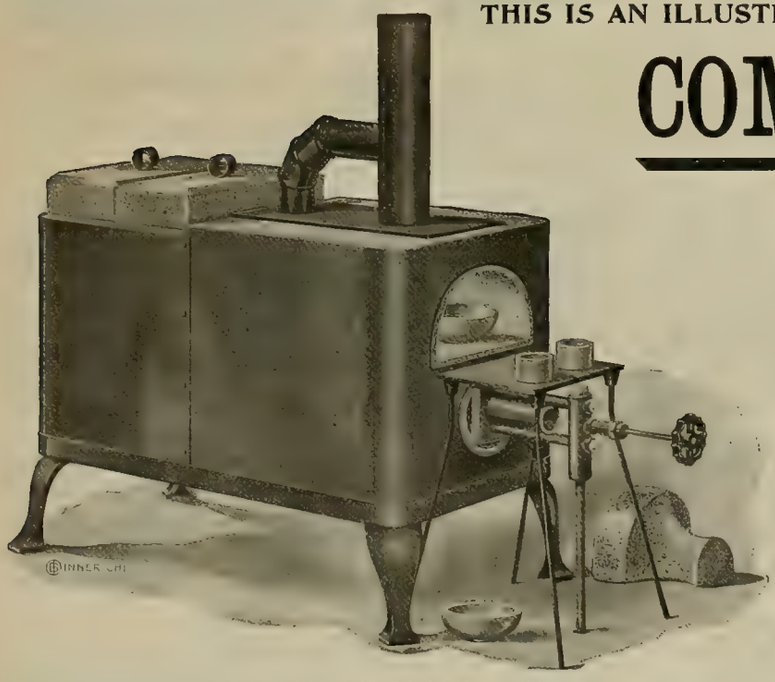
In the issue of this paper of February 16th, we illustrated our

STANDARD BURNER.

THIS IS AN ILLUSTRATION OF OUR NEW

COMBINATION FURNACE,

which we make in two sizes.



PATENTED FEBRUARY 7, 1899.

Work in the crucible chamber of this furnace may be carried on without interfering in any way with operations in the muffle.

No Experiment ---- The result of experience. All inquiries answered fully. For sale by dealers everywhere.

Wm. Hoskins & Co.,

81 So. Clark Street, CHICAGO.

100 POUNDS OF ORE SAMPLED IN 10 MINUTES.

Calkins' Umpire Ore Sampler.

PAT. APPLIED FOR.

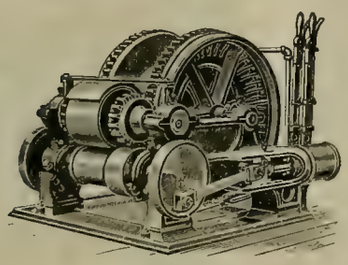
An accurate, quick and absolutely impartial machine for sampling ore in quantities of from one to one hundred pounds. Easily operated and cleaned. No danger of salting subsequent samples. Makes the operation of sampling an easy one; and all competent assayers know that to obtain an assay sample by hand requires more trouble and time than is necessary to reduce the resultant sample to the pulp. Diagonally opposite portions are taken each time; and assay samples are obtained with this machine in less time and with less trouble than by any other method.

F. W. BRAUN & CO., Manufacturers,
LOS ANGELES, CAL., U. S. A.
Importers and Exporters of Assayers' Supplies.

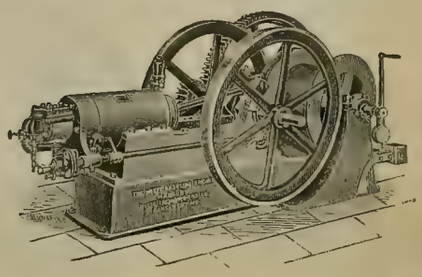
WE MAKE A SPECIALTY OF

HIGH GRADE HOISTING MACHINERY

DESIGNED FOR



STEAM, COMPRESSED AIR,
ELECTRICITY AND GASOLINE.



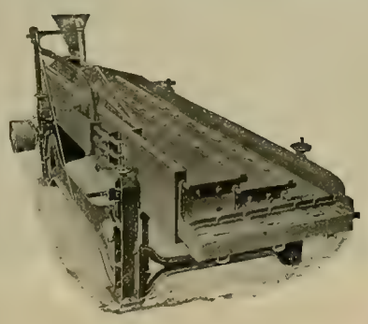
ALL STYLES. ALL SIZES.

Our Line of Patterns Contains Something Exactly Suited to Your Requirements.
WE SOLICIT YOUR CORRESPONDENCE.

The Hendrie & Bolthoff M'f'g & Supply Co.

No. 38. DENVER, - - - - - - - COLORADO.

THE IMPROVED BARTLETT CONCENTRATING TABLE.



The only table made that will take the place of jigs and do away with costly and complicated machinery.
Especially designed for separating zinc from lead.
Solid Iron Tops, planed to a true surface.
All parts are interchangeable.
Wearing parts reduced to a minimum.
Capacity from 15 to 45 tons in 24 hours, according to class of ore.

Our illustrated catalogue contains all the latest information on the concentration of ores. Mailed on application.

THE COLORADO IRON WORKS CO.,
Established 1860. DENVER, COLO., U. S. A.

Two Large Locomotives.

It is a noticeable feature in the industrial development of all countries that it is the mining industry that brings out the best and greatest in every department of mechanical activity. Whatever the kind of applied power needed, it is the work of the mine that calls out the highest skill and finest product of the "men who make things." As in other instances this is the case with locomotives. Till quite recently the largest locomotive was that on the road of the Union Railroad Co., of Pittsburg, Pa., a 23x32-inch freight hauling monster used in mine work; that is, the carrying of mine products. An illustration of it appears herewith. Its gauge is 4 feet 8½ inches, cylinders 23 inches diameter with 32-inch stroke; drivers, 54 inches diameter, outside stroke; driving wheel base, 15 feet 7 inches; total wheel base, 24 feet; weight of engine, 208,000 pounds; boiler, 80 inches diameter; tank capacity, water, 5000 gallons; coal, 10 tons.

On the upper right hand corner of the opposite page, however, is portrayed an even larger and more powerful locomotive, just put on the B. A. & P. road, Montana, to haul ore to the smelters. A comparison between "No. 95," of Pittsburg, Pa., and "No. 19," of Anaconda, Montana, is interesting. Some of the dimensions of the Pennsylvania locomotive have been given above. Corresponding figures for the Montana freight hauler show that its gauge is 4 feet 8½ inches; cylinders 34 inches diameter with 32-inch stroke; drivers, 56 inches diameter, outside stroke; driving wheel base, 15 feet 9 inches; total wheel base, 26 feet 9 inches; weight of engine, 220,000 pounds; boiler, 84 inches diameter; tank capacity, water 5500 gallons; coal, 10 tons. It will be seen that the Montana engine is much larger in nearly every way. In the latter the boiler is of steel 1 inch thick, with a working pressure of 210 pounds to the square inch. Ordinarily boiler sheets are from ½ to ¾ inch. "No. 19" is believed to be the largest machine of the kind in the world. It hauls sixty cars—4000 tons—at a speed of 30 miles per hour, and affords another instance of the gigantic means employed in modern mining.

The engraving of the Pittsburg locomotive was secured from the Smoky City. For the photograph from which the engraving of the Montana big freighter was engraved, we are indebted to the courtesy of Mr. M. Donahue, General Manager B. A. & P. Railway, Anaconda, Montana.

The Anxiety of Mr. Morgan of Kansas.

The following series of inquiries from H. N. Morgan of Harper, Kan., appear in a Washington paper: "I have got 500 sheers of stox in the New Ofir Gold mining co. which has got goald mines somewhare out thair in Wash. terrytory. The stox says it has an ofis in Spoakin. Their agent come thrugh this county 2 years ago and me an' my nabors took a lot of it. He sed the co. had enuff goald in sight to pay the nashunal det. What we want to no is what the co. is doing with its goald? Why doan't we get our sheer? When will the next distrybushun be, and will it be saife to send our sheer by freight? Is thair much danger of rode agints out thair? The agint told us we could jine in the election of offisers. When will it be? Do you think me or my nabors could git one of the offises? I never done no mining, but hav a good deal of expeeryence digging wells and cellars. This is a dry country and I dug 1 well a hunderd and 27 feat depe. Do they go deper than that for goald? Please write the anser right away as we are gittin anxious. Times are hard, and if we cud get our sheer of the goald, it would make menny onest harts happy."

From the Frozen North.

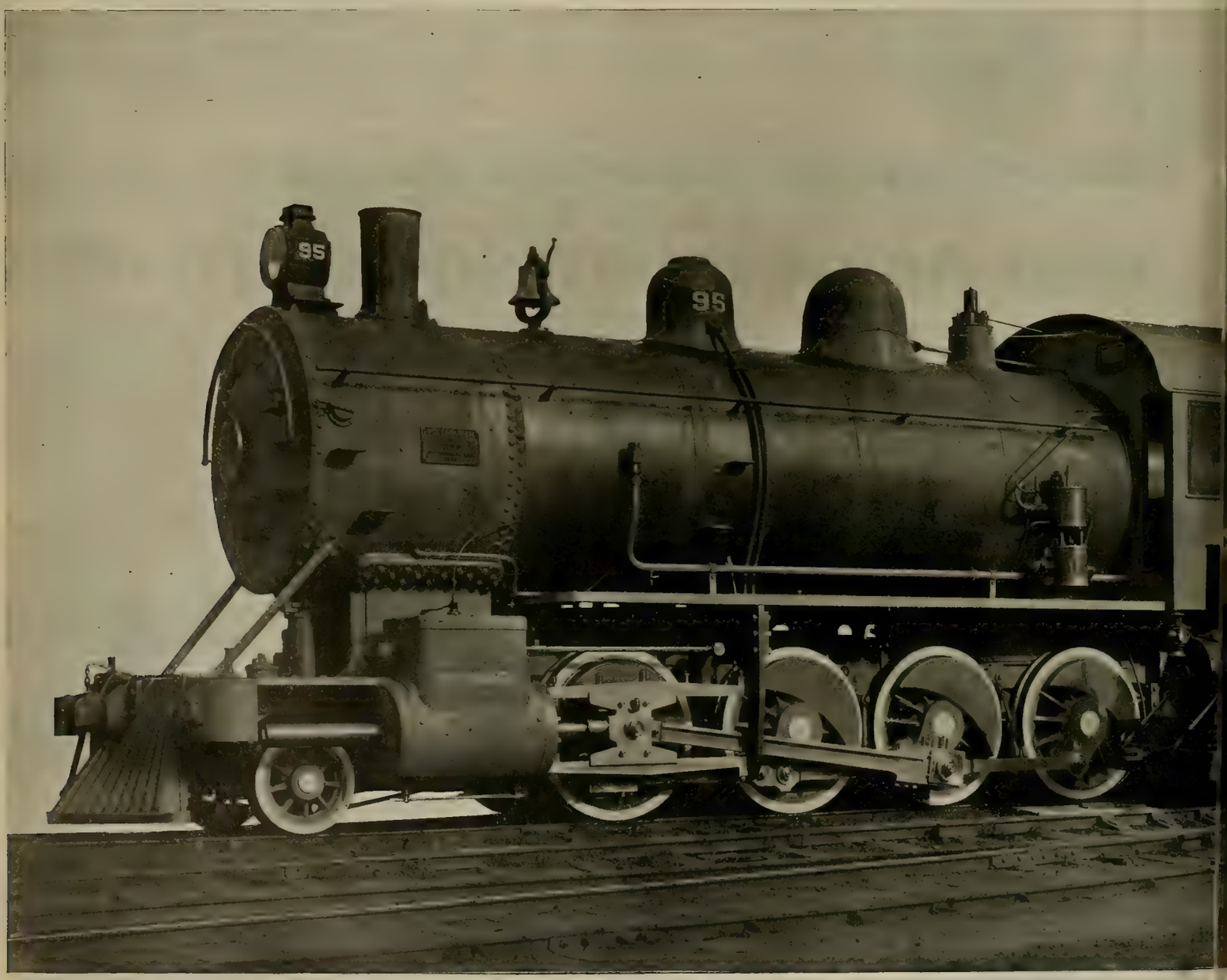
To the Editor:—The sun rises about 10:30 a. m. and sets a little after 1 p. m. The thermometer hovers around zero. The wily stampeder has just struck it rich just over the divide, and all he wants to put you in a location that will make you rich in a minute is a dog team and a little grub. There is no time nor place you don't see the stampeder and his dog team rushing here and there in every direction. He is always ready to go, no matter how cold or what obstacles he has to surmount. He can crawl out of a snow bank as quickly as an Esquimau dog, hitch up and go. There are so many reported strikes one hardly knows where to go first. But there have been some good strikes made during the past two months, which ought to prove good when developed. A few have gone to the reported strike on the Cosquaquim, a tributary of the Yukon, about 600 miles from Nome. But the most promising strikes are reported in this district and the Koogerooeks, and in the Arctic district, north of here, that country sloping toward the Arctic ocean. I met some men just from that section who report fair discoveries, but there is not a particle of fuel of any kind and the ground remains frozen the year round. It is a hard country to live in, and unless one strikes it enormously rich he cannot make it pay.

There is some activity in prospecting the various benches and tundra about Nome, and I look for some good results next season in that direction.

Please save me the back numbers of the Mining and Scientific Press, that I may post myself as to what is being done in the mining world during the winter, and send them up on the first boat to P. O. box 166, Nome.

Port Clarence, Alaska, Dec. 1.

P. S.—Am anxious to know who was elected President.



LARGEST EASTERN FREIGHT LC

LARGEST FREIGHT LOCOMOTIVE IN THE WEST: USED IN MONTANA MINING OPERATIONS.

OMOTIVE.

In Western Idaho.

To THE EDITOR:—In Washington county, in the Seven Devils mining district, there is a deal whereby the Blue Jacket mine will operate again with a force of sixty men. The Blue Jacket has been one of the strong shippers of the district. Last year it turned out $40,000 in copper. The Boston & Seven Devils Copper Co. are working thirty men on the Helena mine. They shipped in February ten cars 40% copper ore. The same company have ten men sorting and shipping ore from the Decorah mine. On the Old Peacock they are working a diamond drill with promising results.

The P. I. & N. R. R. is now at Council, and this will greatly help the shipment of copper ore, leaving only 40 miles wagon freight.

Decorah, Idaho, March 9.

Close Figuring.

A shipment made last week by the Ponsardin will illustrate the necessity of shippers being familiar with the schedule of prices. The shipment was seventy-five tons, carrying, according to the samples, lead 5%, silver 2½ ounces, iron 54%, and silica 7%. The silver contents were worth $1.50, the lead $1.75, and the iron, minus the silica, $7. This was pay ore all right, but the smelter returns gave them but $1.76 per ton for it. The difference came by the smelter finding the lead to be a fraction less than 5%, and the silica 1% greater. The lead running a half of 1% lower than they had calculated, cost them on the little shipment $130, and rendered the further shipment impossible, which would otherwise pay them well.—Leadville, Colo., Chronicle.

In Siskiyou County, California.

To THE EDITOR:—During November and December the mill of the Yreka M. & M. Co. crushed 1500 tons of ore that ran from $12 to $15 per ton in free gold. The sulphurets, of which the ore carries about 3%, run about $160 per ton. The mill was shut down during January and up to Feb. 14th, on account of the unprecedented cold weather and deep snow. Twenty stamps are now running on good ore, and the company expect no more shut-downs until the water gives out. The company expect to crush 6500 tons of ore by July 1st. The Mountain Laurel is now supplying all the ore for the mill. The Ohio mine is deeply blocked with snow.

The air compressor, bought of the Know Nothing mine, is at the Mountain Laurel. The air hoist and pump give satisfaction. The main shaft in the footwall is 60 feet below the lower level; sinking will continue indefinitely. The vein in the shaft is 5 to 7 feet wide and shows free gold and sulphurets. The ore will carry about 5% sulphurets.

The ore in the B Tunnel, Mountain Laurel mine, contains coarse gold. The company expect to install electric, canvas and cyanide plants next season. L. D. Ball is superintendent, J. W. Pierpoint mill foreman, David Jones mine foreman.

There is activity in placer mining in the vicinity of Sawyer's Bar, as there is plenty of water.

Rollin, Cal., March 6.

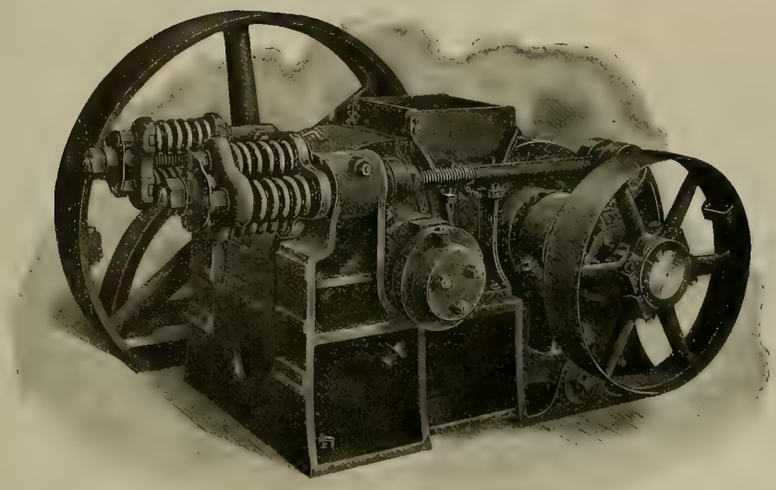
Golden Zone Mine, Washington.

To THE EDITOR:—At the Golden Zone mine the two new Huntington mills are running from forty-five to sixty tons per day. The concentration varies from fifty to thirty to one, depending upon what sections of the mine the ore comes from. The drift in the fourth level crosscut two ledges, one of heavily mineralized quartz varying from 8 inches to 12 inches. The other ledge was 20 feet wide, but of low grade. All of this is being put through the mills.

Loomis, Wash., March 10.

The Edward P. Allis Company

MILWAUKEE, WISCONSIN, U. S. A.



Manufacturers of

The . . . . Reliance . Crushing . Roll . . .

Which represents the highest type of Modern Roll Construction

ALSO A COMPLETE LINE OF

Mining, Milling and Smelting Machinery.

THE MINE AND SMELTER SUPPLY CO.,

DENVER, - - COLORADO.

Mining and Milling Machinery and Supplies.

We beg to call your attention to

THE FINLAYSON PATENT WIRE ROPE TRAMWAY—

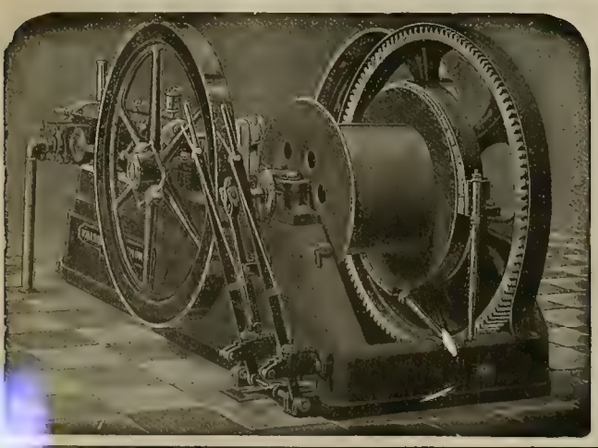
the latest and best system of double-rope automatic aerial tramway in the market.
If interested in the most economical system of transporting ores from mine to mill and to shipping stations, send for our special tramway catalogue.

We carry a complete stock of Machinery and Supplies for immediate delivery.

Send for our special catalogues on Mining Machinery, Milling Machinery, Wilfley Concentrators, Tramways, Power Transmission Machinery, Machine Tools, Etc.

THE MINE AND SMELTER SUPPLY CO.,.....Denver, Colorado
THE MINE AND SMELTER SUPPLY CO.,.....Salt Lake City, Utah
THE MEXICO MINE AND SMELTER SUPPLY CO.,
No. 16 San Francisco St., City of Mexico.

BOILERS, ENGINES, STEAM HOISTERS, ELECTRIC HOISTERS, ROLLS, CRUSHERS, WILFLEY TABLES. CARS, CAGES, ORE BUCKETS, RAIL, PIPE, FITTINGS, BELTING, ETC., ETC.



FAIRBANKS-MORSE GASOLINE-DISTILLATE GEARED HOISTER.

An efficient and reliable combination of a Fairbanks-Morse Gasoline-Distillate Engine on the same base with a Friction Hoist. Modern and up to date. We publish a special catalogue describing our Hoister which we gladly mail prospective purchasers.

FAIRBANKS-MORSE GASOLINE-DISTILLATE ENGINES.

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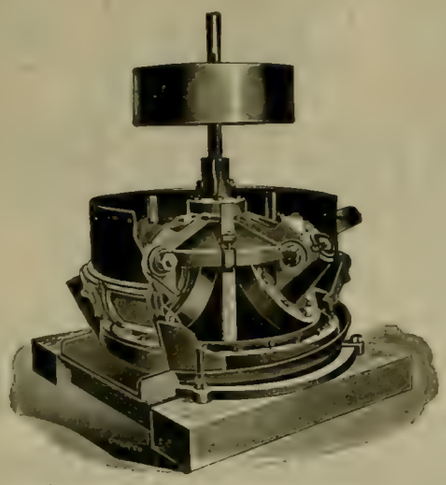

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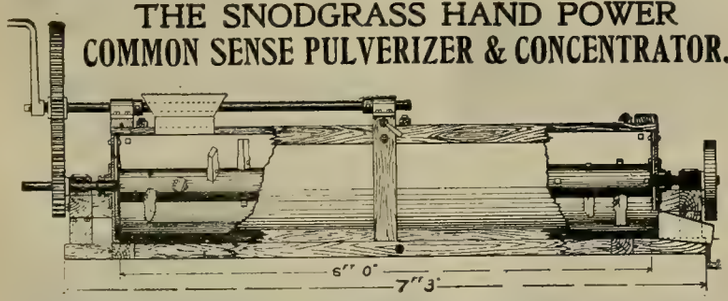

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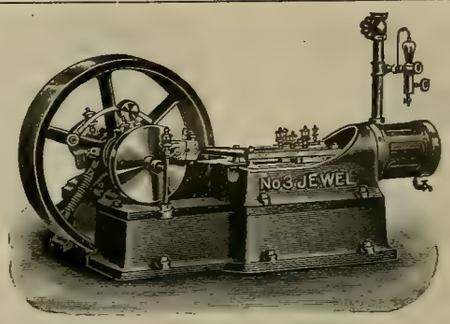

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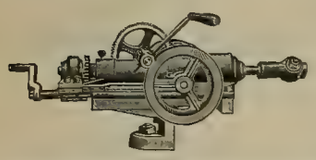

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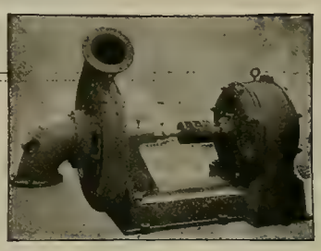

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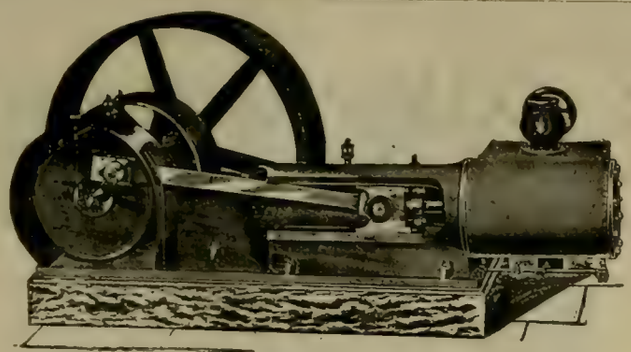

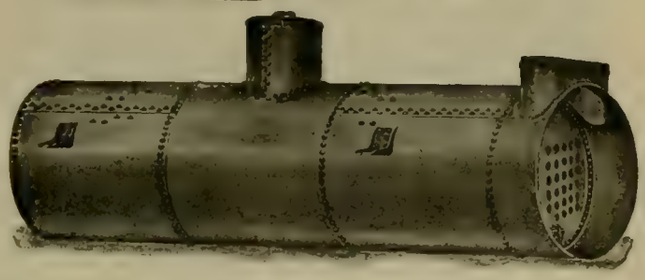

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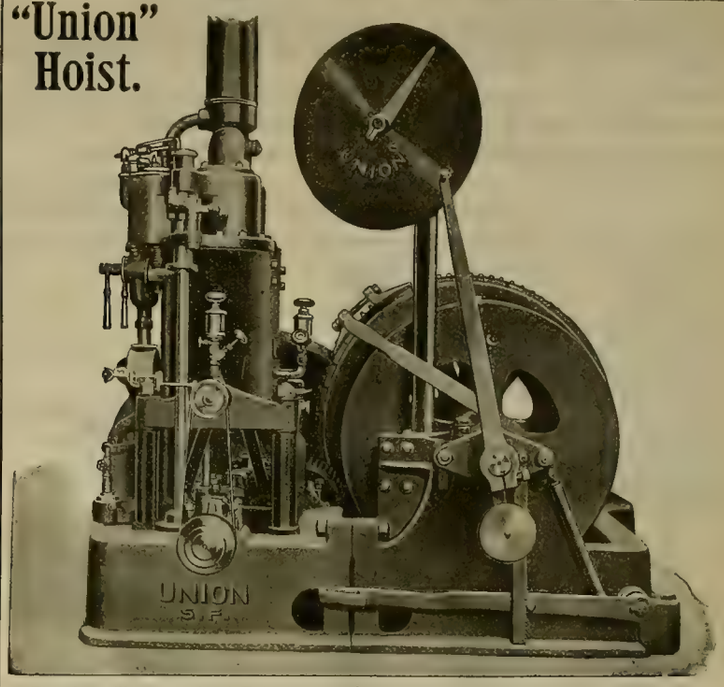

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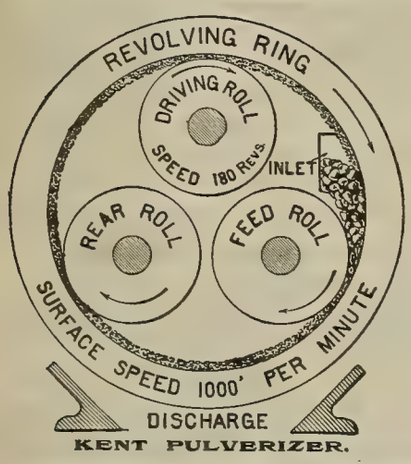

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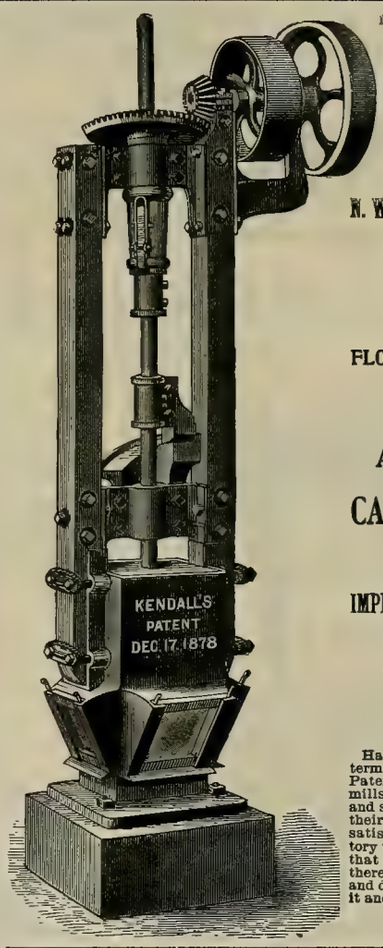

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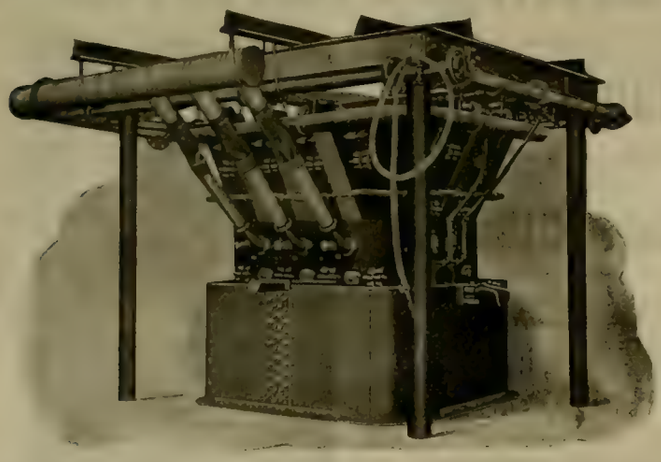

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Fine Cylinders.

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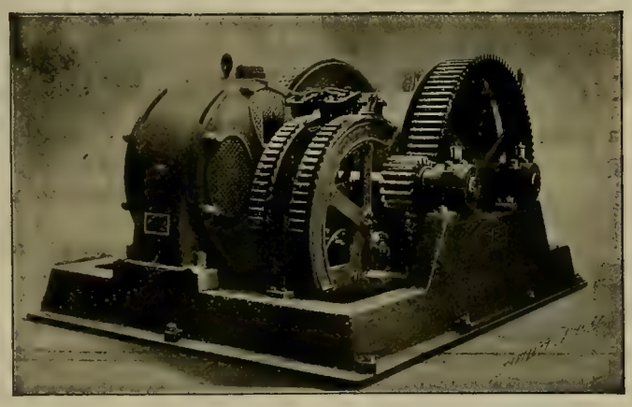
Fine Valves.

Continuous Flow.

All Sand entering Valves Carried to Surface.

and Force it long distances above.



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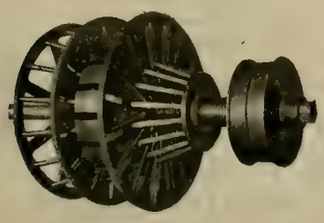

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and be surprised at improved results.

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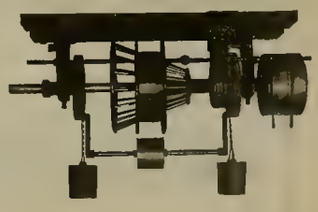

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Gives exclusive attention to the development and utilization of water powers by the most modern, economic and improved methods. An experience of more than fifteen years, involving both the theory and practice of hydraulic engineering as relates to power development in its widest range of application, is at the service of its customers.

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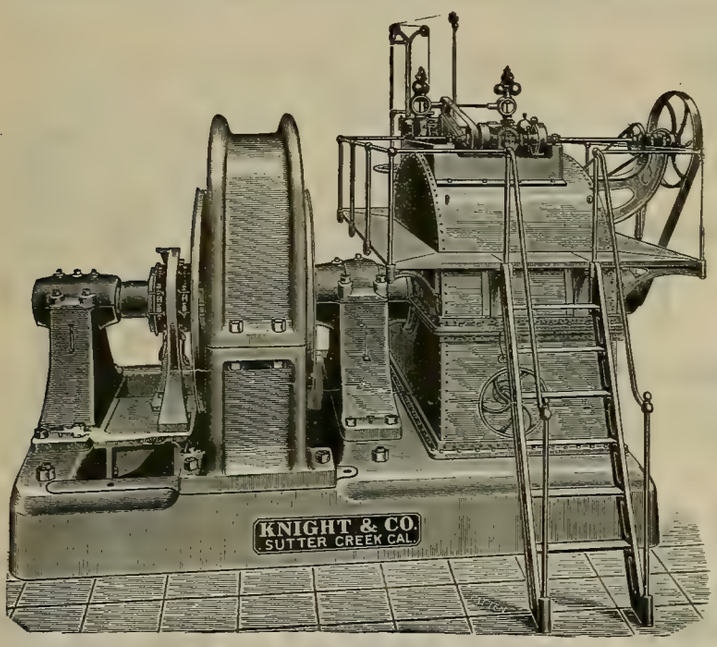
KNIGHT'S WATER WHEEL.



The accompanying cut shows the general arrangement of **The Knight Water Wheel**, direc-coupled to a 750 kilowatt generator, with governor mounted on top of wheel casing.
These wheels are designed for 100 to 2500 H. P. Highest efficiency and regulation guaranteed
WHEELS FROM 6 TO 24 INCHES, ENCLOSED IN CAST-IRON CASING.
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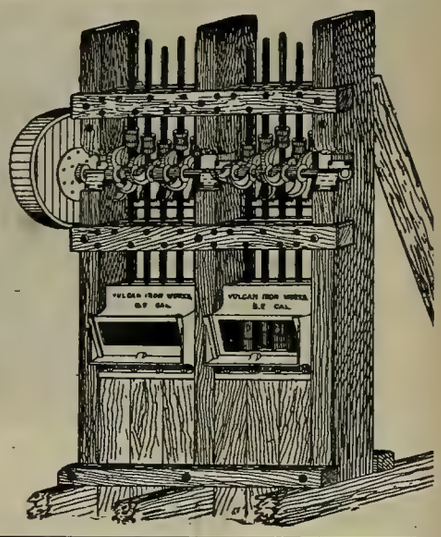

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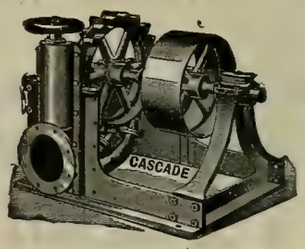

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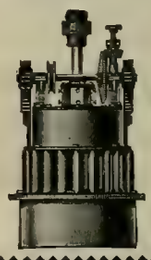

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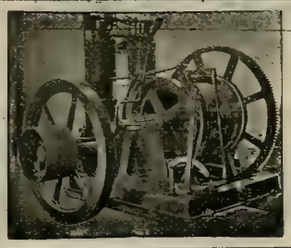

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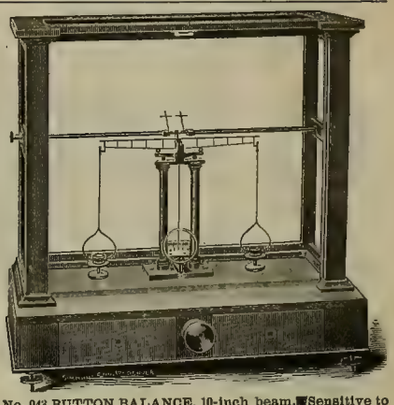

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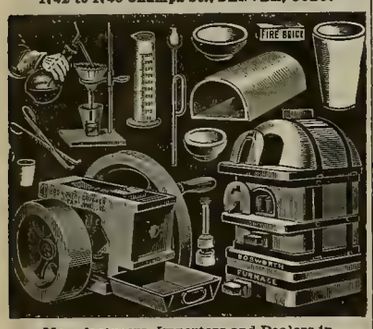

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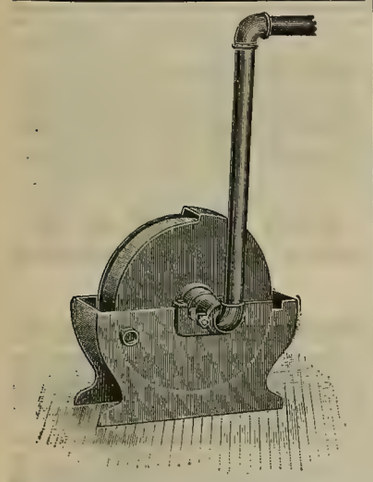

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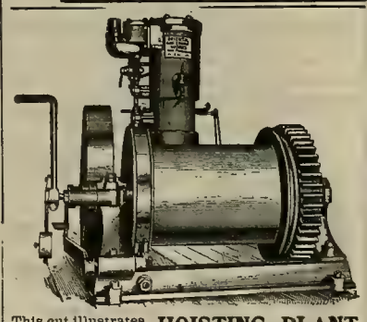

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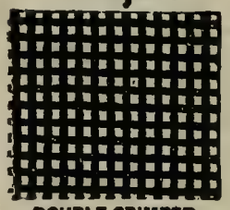

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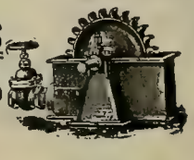

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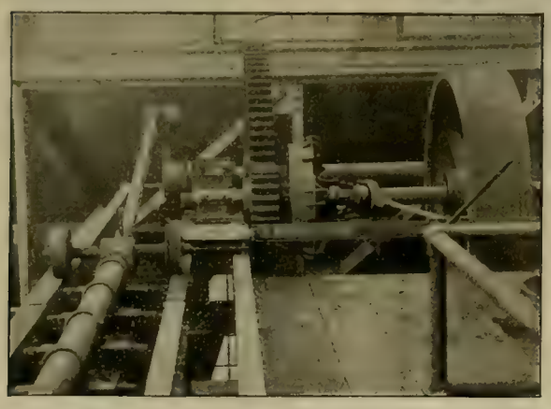

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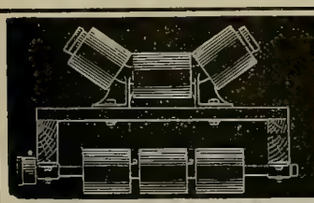

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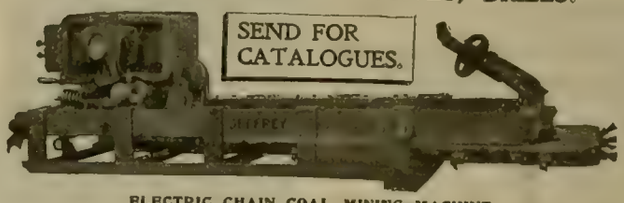

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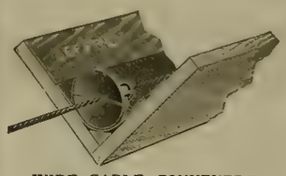

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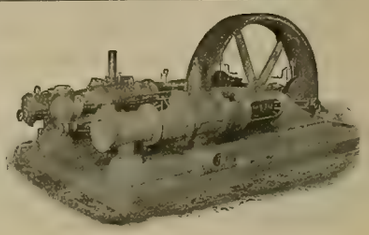

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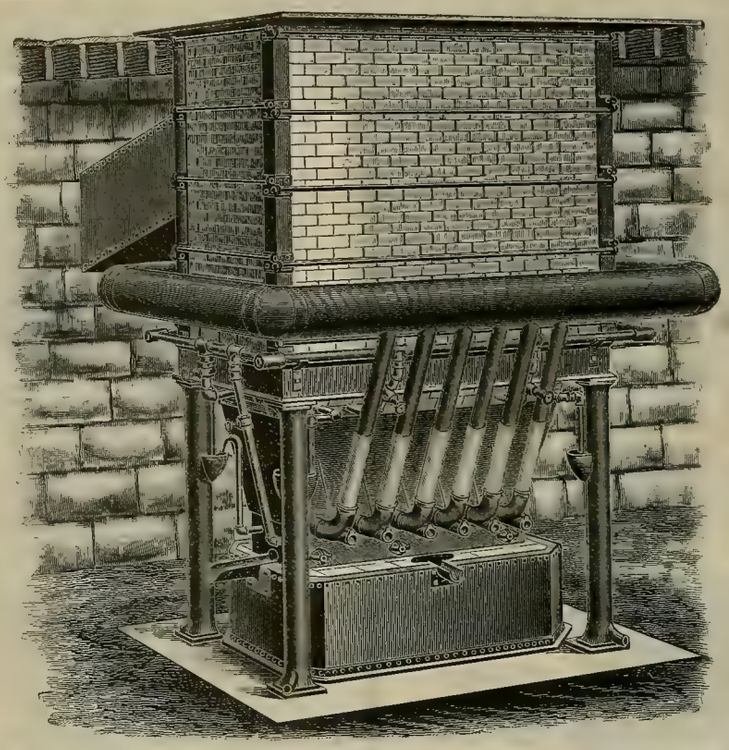

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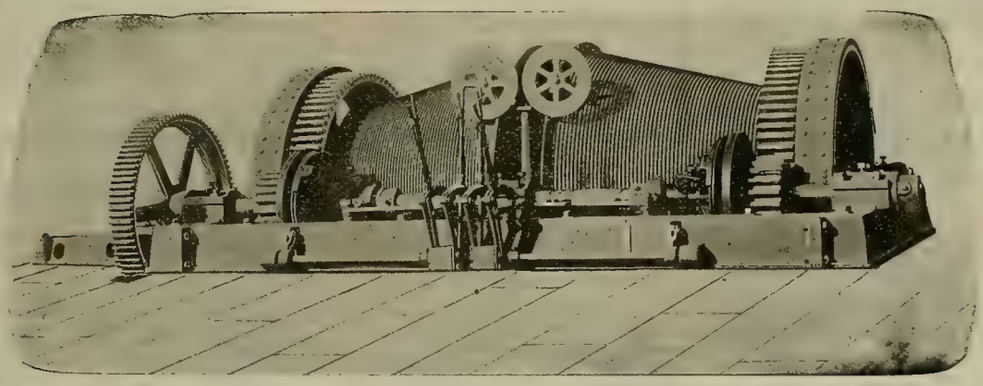

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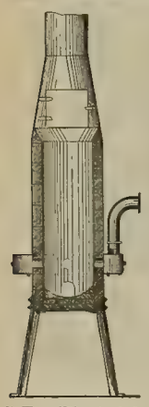

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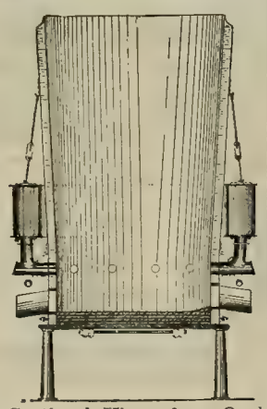

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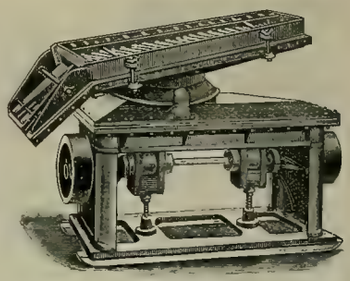

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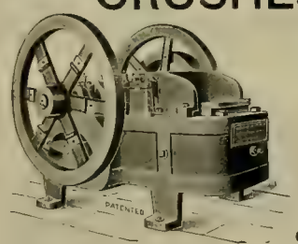

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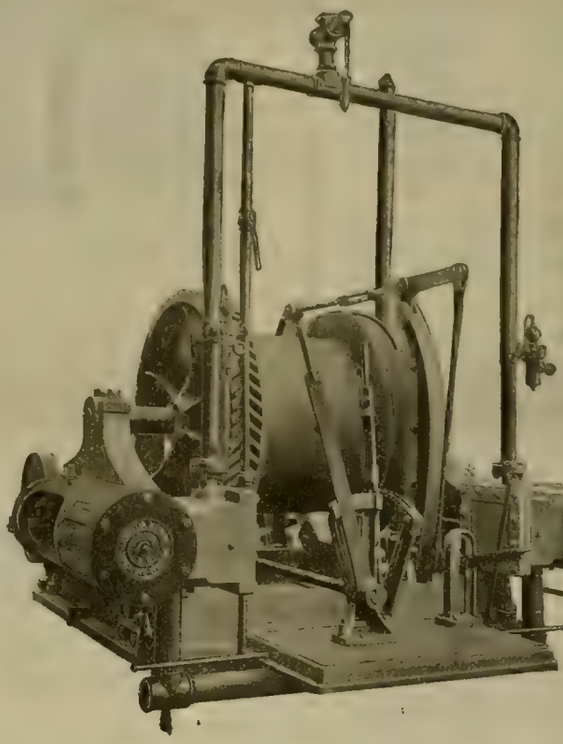

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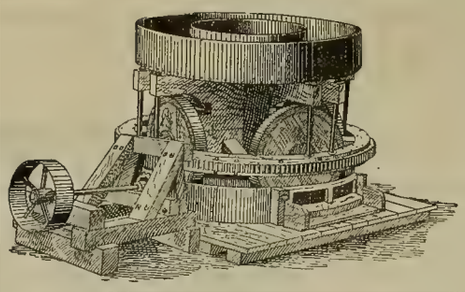

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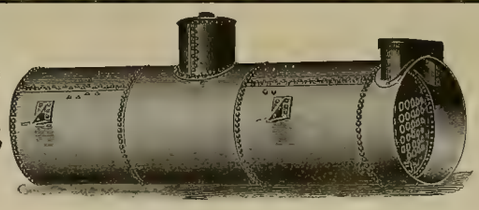

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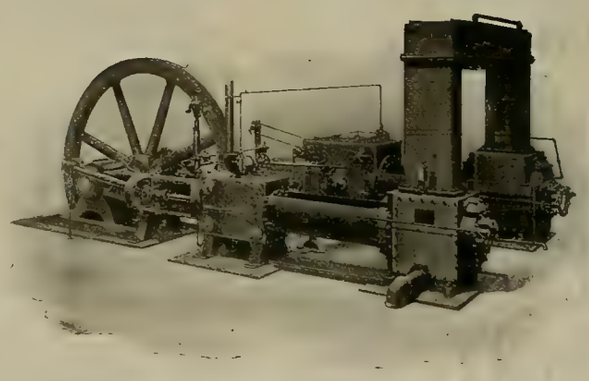

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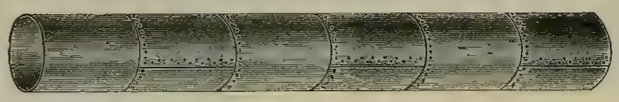

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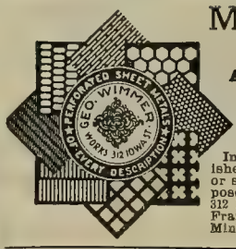

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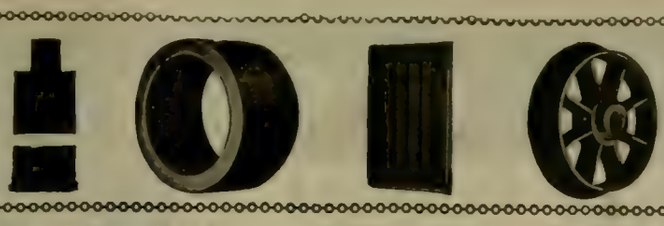

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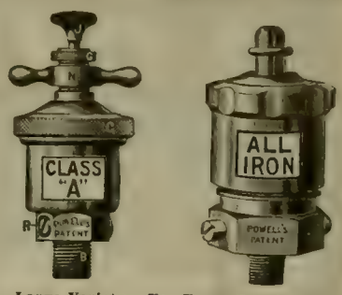

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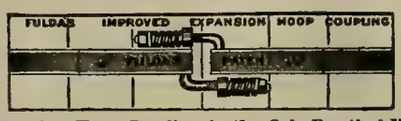

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possess all the improvements and good features that have been suggested by our own and our customers' experience during the past twenty years.

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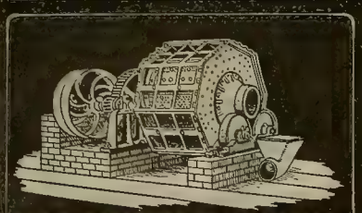

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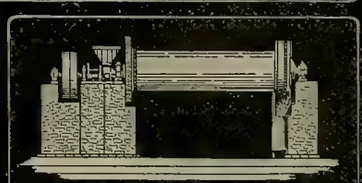

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225

ASSESSMENT NOTICES.

ALLIANCE EXPLORATION & MINING COMPANY.—Location of principal place of business, San Francisco, California; location of works, Ophir, Placer County, California.

Notice is hereby given, that at a meeting of the Board of Directors, held on the 12th day of February, 1901, an assessment (No. 3) of two (2) cents cents per share was levied upon the capital stock of the corporation, payable immediately in United States gold coin, to the secretary, at the office of the company, 236 Sutter street, San Francisco, California.

Any stock upon which this assessment shall remain unpaid on the 18th day of March, 1901, will be delinquent, and advertised for sale at public auction; and unless payment is made before, will be sold on MONDAY, the 8th day of April, 1901, to pay the delinquent assessment, together with the costs of advertising and expenses of sale.

By order of the Board of Directors.

S. GOLDSMITH, Secretary.

Office—236 Sutter street, San Francisco, California.

MARIPOSA COMMERCIAL AND MINING COMPANY.—Location of principal place of business, San Francisco, California; location of works, Mariposa County, California.

Notice is hereby given, that at a meeting of the Board of Directors, held on the 23d day of February, 1901, an assessment (No. 21) of Ten ($10) Dollars per share was levied upon the capital stock of the corporation, payable immediately in United States gold coin, to the secretary, at the office of the company, 320 Sansome street, room 24, San Francisco, California.

Any stock upon which this assessment shall remain unpaid on the 11th day of April, 1901, will be delinquent, and advertised for sale at public auction; and unless payment is made before, will be sold on SATURDAY, the 4th day of May, 1901, to pay the delinquent assessment, together with the costs of advertising and expenses of sale.

By order of the Board of Directors.

JOSEPH H. MOOSER, Secretary.

Office—320 Sansome street, room 24, San Francisco, California.

SPANISH CONS. QUARTZ MINING COMPANY.—Location of principal place of business San Francisco, California; location of works, Nevada County, California.

Notice is hereby given, that at a meeting of the Board of Directors, held on the 12th day of February, 1901 an assessment (No. 4) of five (5) cents per share was levied upon the capital stock of the corporation, payable immediately in United States gold coin, to the secretary, at the office of the company, 113 Crocker Building, San Francisco, California.

Any stock upon which this assessment shall remain unpaid on the 19th day of March, 1901, will be delinquent, and advertised for sale at public auction; and unless payment is made before will be sold on MONDAY, the 8th day of April, 1901, to pay the delinquent assessment, together with costs of advertising and expenses of sale.

By order of the Board of Directors.

B. N. SHOECRAFT, Secretary.

Office—113 Crocker Building, San Francisco, California.

The Florence AND Cripple Creek Railroad Company.

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THE GOLD MINES OF THE CRIPPLE CREEK DISTRICT ARE CONVENIENTLY and COMFORTABLY REACHED VIA THE FLORENCE & CRIPPLE CREEK RAILROAD.

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DELINQUENT SALE NOTICE.

AMERICAN OIL AND REFINERY COMPANY.—Location of principal place of business, San Francisco, California. Location of works, Contra Costa County, California.

NOTICE.—There are delinquent upon the following described stock, on account of assessment (No. 2) levied on the 26th day of November, 1900 the several amounts set opposite the names of the respective shareholders, as follows:

Names.	No. Cert.	No. Shares.	Amt.
Abbott, William	720	50	$2 50
Abbott, William	721	50	2 50
Abbott, William	722	50	2 50
Abbott, William	723	25	1 25
Abbott, William	734	25	1 25
Anthony, J. C., Trustee	797	1,000	50 00
Anthony, J. C., Trustee	798	1,000	50 00
Anthony, J. C., Trustee	799	1,000	50 00
Anthony, J. C., Trustee	973	1,000	50 00
Anthony J. C., Trustee	1021	4 300	215 00
Dignan, J. P.	1039	1,000	50 00
French, Mrs. Mary L.	385	2	10
Goodenough S.	1046	380	19 00
Holbrook, W. E., Trustee	897	10 000	500 00
Holbrook, W. E., Trustee	898	11,000	550 00
Holbrook, W. E., Trustee	899	4 500	225 00
Holbrook, W. E. Trustee	900	4,500	225 00
Kielhofer, Mrs. Louis	298	2	10
Kraehmer, Louis L.	471	3	15
Laird, Mrs. L. N.	230	5	25
Lord, Mrs Leona E.	327	2,000	100 00
Lucas Mrs T. R.	848	10	50
Maver, Mrs. L.	406	800	40 00
Massey, James B.	914	1	05
McKelvey, Mrs Angelina	71	12	60
McAllister, H. L.	1071	100	5 00
Pope, Wm	656	50	2 50
Pope, Wm	695	20	1 00
Pope, Wm	764	30	1 50
Pope, Wm	908	20	1 00
Raht, Julia F.	321	25	1 25
Raht, Julia F.	453	40	2 00
Rachel, Mrs. Eliza	856	400	20 00
Royce, Lizzie A.	441	5	25
Russell, G. E.	125	3	15
Stover, W. M.	1047	480	24 00
Truitt, J. J.	399	5	25
Walser, Mark	858	1,000	50 00
Walser, Mark	859	1,000	50 00
Walser, Mark	860	1,000	50 00
Walser, Mark	861	1,000	50 00
Walser, Mark	863	500	25 00
Walser, Mark	867	500	25 00
Walser, Mark	868	500	25 00
Walser, Mark	869	500	25 00
Walser, Mark	870	500	25 00
Walser, Mark	871	500	25 00
Walser, Mark	872	500	25 00
Walser, Mark	921	50	2 50
Walser Mark	926	5,000	250 00
Walser, Mark	927	5,000	250 00
Walser, Mark, Trustee	596	500	25 00
Walker, Mrs. S. E. D. E.	375	120	6 00
Young, R.	761	328	16 40

And in accordance with law, and an order from the Board of Directors, made on the 26th day of November, 1900, so many shares of each parcel of such stock as may be necessary, will be sold at public auction at the office of said corporation, in Rooms 322-323 Parrott building, San Francisco, California, on MONDAY, the 28th day of January, 1901, at the hour of 1 o'clock P. M. of said day, to pay said delinquent assessment thereon, together with costs of advertising and expenses of sale.

J. C. ANTHONY, Secretary.

Office—Rooms 322-323, Parrott building, San Francisco, California.

POSTPONEMENT.

By order of the Board of Directors, the day of sale of the above delinquent stock has been postponed to MONDAY, the 11th day of February, 1901, at the hour of 1 o'clock P. M., at the office of said corporation in Rooms 323-323 Parrott building, San Francisco, California. J. C. ANTHONY, Secretary.

POSTPONEMENT.

By order of the Board of Directors, the day of sale of the above delinquent stock has been postponed to MONDAY, the 26th day of February, 1901, at the hour of 1 o'clock P. M., at the office of said corporation in Rooms 322-323 Parrott building, San Francisco, California. J. C. ANTHONY, Secretary.

POSTPONEMENT.

By order of the Board of Directors, the day of sale of the above delinquent stock has been postponed to MONDAY, the 11th day of March, 1901, at the hour of 1 o'clock P. M., at the office of said corporation in Rooms 322-323 Parrott building, San Francisco, California. J. C. ANTHONY, Secretary.

POSTPONEMENT.

By order of the Board of Directors, the day of sale of the above delinquent stock has been postponed to MONDAY, the 25th day of March, 1901, at the hour of 1 o'clock P. M., at the office of said corporation in Rooms 322-323 Parrott building, San Francisco, California. J. C. ANTHONY, Secretary.

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DELINQUENT SALE NOTICE.

YUBA RIVER GOLD DREDGING COMPANY.—Location of principal place of business, San Francisco, California; location of works, Smartsville, Yuba County, California.

Notice.—There are delinquent upon the following described stock, on account of assessment (No. 2) levied on the 4th day of January, 1901, the several amounts set opposite the names of the respective shareholders, as follows:

Names.	No. Cert.	No. Shares.	Amt.
Henry Hilp	4	5	$0 15
Albert Moch	8	2,000	60 00
A. W. Goldsmith	9	2,000	60 00
H. L. Frank	14	1,000	30 00
H. L. Frank	15	1,000	30 00
H. L. Frank	16	1,000	30 00
H. L Frank	17	1 000	30 00
H. L. Frank	18	1,000	30 00
H L. Frank	19	1,000	30 00
H. L. Frank	20	1,000	30 00
H L. Frank	21	1,000	30 00
H L Frank	22	1 000	30 00
Henry Hilp	28	500	15 00
M E. Mayer	32	500	15 00
Hannah Heringhi, Trustee	33	300	9 00
S. Belasco, Trustee	34	200	6 00
Ed. Pelasco, Trustee	35	200	6 00
Sarah Mayer, Trustee	36	200	6 00
I Belasco	37	250	7 50
S. Belasco	38	100	3 00
Rose Haas	39	200	6 00
E Heringhi, Trustee	40	200	6 00
Mark Thall	41	200	6 00
Louis Heringhi	48	100	3 00
Martin Freund	49	500	15 00
G. A Kornberg	66	10,000	300 00
G. A. Kornberg	67	10,000	300 00
G. A. Kornberg	68	10,000	300 00
G A. Kornberg	72	1,000	30 00
G. A. Kornberg	73	1,000	30 00

And in accordance with law, and an order from the Board of Directors, made on the 4th day of January, 1901, so many shares of each parcel of such stock as may be necessary, will be sold at public auction at the office of the company, Room 81, No. 214 Pine street, San Francisco, California, on TUESDAY, the 5th day of March 1901, at the hour of 2 o'clock P. M. of said day, to pay said delinquent assessment thereon, together with costs of advertising and expenses of sale.

ALBERT CERF, Secretary.

Office—No. 214 Pine street, Room 81, San Francisco, California.

POSTPONEMENT.

By order of the Board of Directors the day of sale of the above delinquent stock has been postponed to THURSDAY, April 4th, 1901, at the same hour and place. ALBERT CERF, Secretary.

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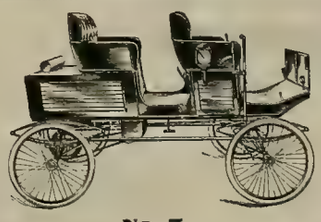

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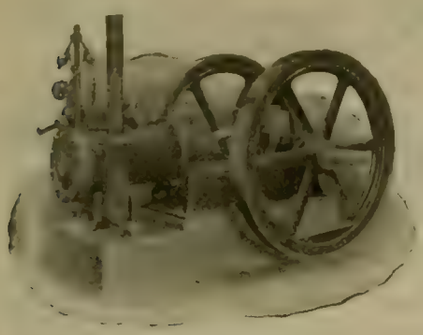

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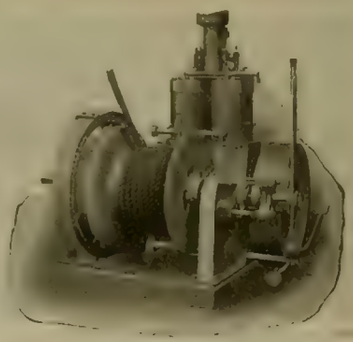

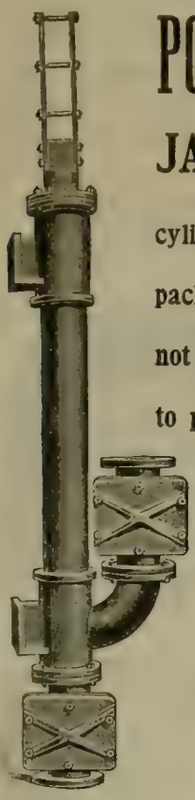

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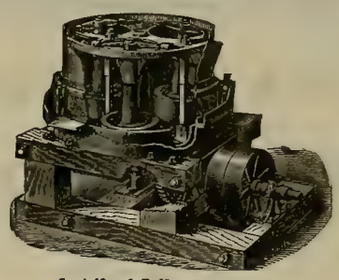

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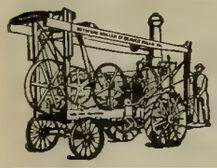

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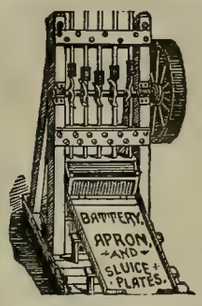

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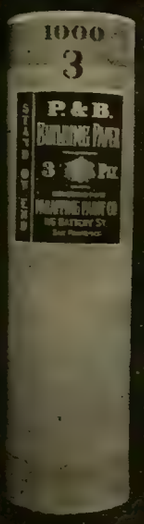

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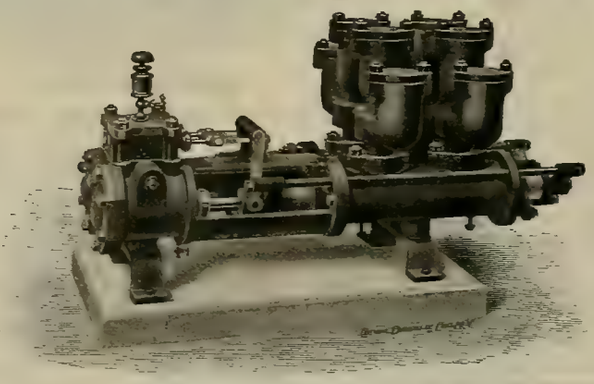

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MINING AND SCIENTIFIC PRESS, 330 Market St., San Francisco, Cal.

MINING AND SCIENTIFIC PRESS.

Whole No. 2122.—VOLUME LXXXII. Number 12. SAN FRANCISCO, SATURDAY, MARCH 23, 1901. THREE DOLLARS PER ANNUM. Single Copies, Ten Cents.

Tin Mining in the United States.

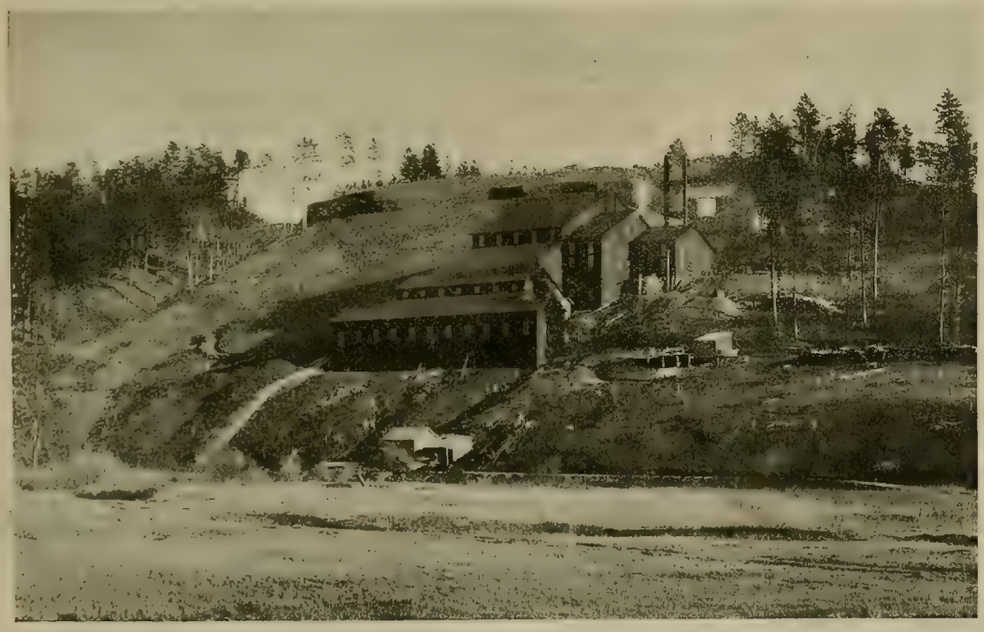
Constant increases in the manifold uses of tin and scarcity of tin deposits on this continent lend interest to possibility of tin production anywhere in the United States. Last year this country imported 71,000,000 pounds tin, valued at $16,000,000. At times discoveries of tin have been reported in various sections throughout this west half of America, but scientific investigation showed no proof, or else mismanagement or misrepresentation prevented development.

In the States of California and South Dakota it has been shown that tin ore in paying quantities exists. The tin deposits at Temescal, in the southern part of California, have heretofore received considerable attention in this journal. These tin deposits lie in the center of a semi-circular area of granite 2 miles in diameter in the northwestern portion of the San Jacinto grant, 5 miles southeast of South Riverside, Cal. The sedimentary rocks along the edge of the granite area are quartzite mica schist and conglomerate. The granite is distinctly intrusive; it consists of plagioclase, orthoclase and quartz in equal proportions, with a less amount of biotite mica. The semi-circular area of granite and portions of the adjoining porphyry are fissured in a northeast and southwest direction along innumerable lines and a black vein matter deposited. These veins vary from ¼ inch to 3 inches in thickness, except in the case of the main tin-bearing vein at Cajalco hill, which is in places 20 feet wide; 400 feet northeast of Cajalco hill the vein narrows to 6 feet. At that point a large body of tin ore was discovered and the main shaft sunk. The vein here consists of equal parts of tourmaline and quartz, the bunches of tin appearing to have been formed by replacement. Workings to the depth of 180 feet exposed the vein 8 feet wide, and, horizontally, 300 feet, the tin oxide distributed either through the vein matter or in stringers and bunches. The average of the ore milled was about 5% oxide. Analyses of ore therefrom quoted by Genth, Blake and Hanks showed silicic acid, 9.82%; tungstic acid, .22%; oxide of tin, 76.15%; oxide of copper, .27%; oxides of iron, manganese, lime and alumina, 13.54%—an exceptionally pure specimen.

Cambria, Wyoming, Whence Comes Most of the Coal Used in Refining Black Hills Ores.

The Temescal tin ore occurs in two forms, the more important and common variety either massive and of a brownish color, or in clear reddish-brown crystals lining cavities; the less common variety is that of "wood tin," which appears uncrystallized and in the form of thin layers. Nothing material has been done at the Temescal tin mines for ten years.

It has also been some considerable time since any activity in developing the tin deposits of South Dakota, since the culmination of the misapplied efforts in the case of the Harney Peak Tin Co., in the Harney Peak tin range, in Pennington and Custer counties. With American and English capital, in equal proportions, the Harney Peak Tin Co. erected mammoth mills (a view of these at Hill City appears herewith) with unsatisfactory results, and amid general crimination and recrimination the project fell through. The company was organized in New York City about ten years ago, and in one way and another nearly $2,000,000 were spent. The greater part of this money came from England, but passed through the hands of New York promoters. Several carloads of ore were sent to England which carried 20% black tin, and there was no difficulty in getting money for investment; but nothing tangible was ever done at the mine, except to show that, properly managed, the property could be made to pay, till finally disagreements between stockholders and directors on both sides of the ocean resulted in closing everything and the appointment of a receiver. It is now stated that the stockholders of that company are moving in the matter of reorganization and resumption of work on their holdings.



Harney Peak Tin Mining Company's Plant, Hill City, South Dakota.

This year gives promise of active development of the tin mines of the Black Hills. The Niagara Tin Smelting Co. of New York, capitalized at $1,000,000, has organized and claims to own eighty acres of tin deposits in Bear Gulch, 7 miles from Iron creek, on the B. & M. Railroad. Bear Gulch produces tin of a different nature to that noted in Temescal, Cal.—a stream tin, or cassiterite; a shipment of several tons of Bear Gulch tin ore sent to Cornwall, England, in 1900, gave an average of 24% metallic tin. It is the stated intention of the Niagara Tin Smelting Co. to build a concentrating plant in Bear Gulch with a daily capacity of 150 tons ore, to produce eight tons high-grade concentrates for shipment to the electric smelting works at Niagara Falls, N. Y.

Worked on a large scale, intelligently and in compliance with modern mining methods, there should be resultant profits in the proposed tin development of that section.

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San Francisco, March 23, 1901.

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INDICATIVE of what the California oil production means to the mining and manufacturing industries of the Pacific coast is the action of some of the largest fuel consumers in Arizona, which are arranging to substitute oil for coal.

THE United States Geological Survey has undertaken the collection of statistics of the annual production of gold and silver from the mines of the United States, and will place the work in charge of one representative in each producing State and Territory.

CRIPPLE CREEK, COLO., till recently had no mine shaft over 1200 feet in depth. That the ore "goes down," as elsewhere, is being daily demonstrated, and, as elsewhere, deep mining is now projected, in several instances to a depth of 3000 feet. At a point 3000 feet below the croppings of the Kennedy mine, Amador county, Cal., last week an unusually rich vein of gold ore was struck. This week the North Star ledge, in Nevada county, Cal., has been struck at a vertical depth of 1600 feet, showing that deep mining also pays in California.

RECENTLY was noted in an electrical work involving the expenditure of several hundred thousand dollars that the bids from the six competing firms were within a few dollars of each other, illustrating the exactitude of conditions, and how closely such things are figured. Last week in response to bids asked for cast iron water pipe at Los Angeles, Cal., bids were received from all parts of the country west of the Mississippi, the contract being given to a San Francisco firm at $29.50 per short ton, a Colorado firm bidding $30 and a St. Louis, Mo., firm $29.75.

ANDREW CARNEGIE, who said some time ago that it was a disgrace to a man to die rich, is putting his precept into practice by princely endowments of various deserving projects, and now proposes to cap his former gifts by giving $25,000,000 for the erection and maintenance of a technical school in Pittsburg. It is the miners who always do big things, and when a master miner like Carnegie starts a scheme of that kind he has the brains and the money to make it a success. The great good that such a school can do is so manifest that it needs no elaboration. Apart from its monumental relation to its founder, it will advance mining and scientific progress in a degree commensurate with its opportunities and help the mining industry.

Ore Concentration by Oil.

Several references have already been made herein to the Elmore ore concentration process, designed for concentration of ore, tailings and slimes by the use of oil. The process is stated to be now in operation at the Glasdir copper mines, Dolgelly, Wales. The treatment differs materially from customary forms of ore concentration, as the principle of operation does not depend upon the difference in specific gravity of the materials, but on the surface condition of the ore, and on the fact that some surfaces are attachable to oil, and others are not. In the operation at Glasdir, copper ore, after passing through a breaker, then crushed by rolls and further reduced to pass through a 30-mesh screen, is passed as wet pulp into the open end of a horizontal rotating drum, kept constantly agitated and pushed forward by a cross-bladed helix, a small quantity of petroleum residue being introduced with the pulp. According to the account furnished, "this oil sticks to and buoys up the particles of mineral that are floating about in the pulp, but it has no effect upon the particles of rock present." From the horizontal rotating drum the pulp and oil discharge into a box in which the rock residue settles and flows off with the water at the bottom, the oil carrying the ore floating to the top and flowing continuously into a machine wherein by centrifugal force the oil is extracted from the ore, ready for re-use. It is stated that the plant weekly treats 250 tons of ore, and 80% of the copper contents of the ore are recovered. Further tests with free-milling gold ores and sulphides are stated to have afforded satisfactory results, but no details are to hand. The loss of oil is stated to be from one to three gallons per ton of ore treated. The process is a decided innovation on existing concentration methods, and further details of experiment and results would be of general interest. The controllers of the Elmore process say they would like to get samples of gold-copper ores, which they will treat free of cost to mine owners and report results. Their address is 4 Bishopsgate street (Within), London E. C., England.

A NOTICEABLE FEATURE of the mining industry is the increasing number of publications entirely devoted thereto. There is probably no department of industrial life in which a greater degree of such activity is manifest. New journals have started up in all sections of the metal mining region in the last few years, some of them with sufficient reason for existence to enable continuance. Especially noticeable is the increase of mining publications on the Pacific coast, finely exemplifying the prominence of the mining industry. In California the activity in oil production has occasioned considerable accession to current mining literature, two dailies and four weeklies having been added to the number of mining publications already appearing. In Colorado also, especially in Denver, the number of mining journals is increasing. In addition, the newspapers throughout the entire west half of America devote considerable attention to metal mining, and even mining publications east of the Alleghanies are similarly influenced to give increased attention to the great basic industry of the nation.

BRITISH COLUMBIA makes a mistake in its treatment of the lode prospector. It charges him $5 annual license fee; a $3 poll tax; $2.50 every time he does anything in connection with his claim; 50 cents a cord royalty for timber he uses on his claim, and if ever he gets his prospect to the productive stage he has to pay 2% royalty on all net returns. A good deal has been said about the prospector—his courage, ability, etc.—much of which is so. As a plain business proposition, it is to be noted that the prospector should not be restricted, rather encouraged. He is the mainstay of the mining industry, the pioneer in all mining, the man who makes mining possible, the best friend of the miner, the mining machinery manufacturer and the precursor of all the industries attendant upon mining. He does not ask any favors, but the region that restricts him hurts itself. It is a mossback policy to discourage the prospector, as it tends to keep capital out of a mining country. Several mining sections found this out long ago.

GEORGETOWN, COLORADO, business and mining men have commendably adopted a good way in which to advertise the mines of that section. They have incorporated, raised some money and are using the columns of the local paper, the Courier, to weekly present truthful statement of the showing and output of the mines in that part of Clear Creek county. This is in line with what has often been suggested in these columns and is of practical value. There are so many reasons why such work is good, and they are so manifest that it should be unnecessary to present them. Of course, it may be said that no amount of advertising will put one dollar's worth of ore in the ground, but it will help take out many a dollar's worth of ore that otherwise would remain there and would liven up many a mining camp. The Georgetown people are merely putting into execution a realization of the idea that this is the day of advertising, and that anything worth advertising should have it. It would be well if other sections followed the example of the Georgetown people; there is no other one element of more value to local mining industries than the home paper published right where the mines are being developed. Every line of truthful statement so published is of value to every resident; it attracts attention, some of it is republished in prominent mining journals throughout the country, and the district and its claims to notice are thus brought to the attention of mining men and investors. Too little credit is given the local papers published in mining towns of this west half of America for their ofttimes unaided and unappreciated efforts in bringing to notice the mines of their localities, and it would be money well spent for the enterprising business men and mine owners of every town supporting a paper to do what has been done in Georgetown.

THE technical press of the country has long urged the adoption of a national bureau of standards, and in accordance therewith Congress has passed a bill establishing such a bureau and appropriated $100,000 toward the erection of a suitable building at Washington, D. C., the entire cost of which is not to exceed $250,000. It is of direct benefit to the electrical manufacturing industry of the country. In connection with this whole subject of standardizing comes more frequently the suggestion from various quarters that the time has arrived when concerted private effort is requisite to create some system of standardization in the matter of mining machinery manufacture. The idea is not deemed practicable. It is one thing to secure electrical standards, and quite another to attempt any standardizing of any kind of machinery, electrical or otherwise. To "standardize" mining machinery would be an impossible effort, and even if possible would be unsatisfactory, tending to repress advance and improvement. The best thing that can be done in that direction is systematic economy in factory processes. In pumps and boilers effort has been made to create and maintain standard specifications, with some degree of success, but, in general, the demand for individuality and progress will constantly work against the adoption of standards for machinery.

A LOCATION of a placer claim upon public surveyed lands must conform to legal subdivisions; otherwise such location is invalid and the claim is subject to relocation by the first comer. Where placer claims are upon surveyed lands and conform to legal subdivisions, no further survey or plat is required. Where placer claims can not conform to legal subdivisions, survey and plat should be made as on unsurveyed land. In the case where a placer claim can not be conformed to legal subdivisions, the burden of the proof that they can not be so conformed rests entirely upon the locator, and can only be proven in cases where, before the public survey was made, certain mineral or agricultural claims were laid, or where an unnavigable stream intervenes, the gravel bed of which is mineral bearing, and claims usually called river claims are located thereon. In such cases, and only in such cases, can a placer claim on public surveyed lands depart from legal subdivisions. In all such cases the law admits of survey and plat as on unsurveyed lands. These being the only exceptions under the law, it is for the locator to prove that such conditions exist as to make it necessary to depart from a location by legal subdivisions.

Concentrates.

PYRITIC gold ore can be treated by chlorination at a cost of $5 per ton.

THE following alloy will not oxidize: 120 parts brass, 60, nickel; 8, platinum.

THE average percentage of silver in California gold ore varies from 5% to 20%.

BUTTE, MONT., consumes about 250,000 pounds dynamite monthly, mostly 60% powder.

THE Idaho Legislature has appropriated $5000 for the mining congress to be held in Boise in July.

CALIFORNIA freight engine fuel tests show that four barrels oil equal 2240 pounds Nanaimo coal.

A 3-INCH NOZZLE under an effective head of 100 feet would discharge 3.14 cubic feet water per second.

CALIFORNIA-MADE DYNAMITE can be put at a profit afloat in South African ports at 17 cents per pound.

THERE are 880 stamps on Douglas Island, Alaska, and their combined annual capacity is about 900,000 tons.

P. & B. PAINT is a good coating for iron pipe. Asphalt lacquer, thin, is also good; if the latter is wanted gray, add zinc oxide; if brown, red lead.

MERCURY CHLORIDE is found in minute quantity at the Terlingua quicksilver mines, Terlingua, Texas, occurring as a white bloom on some of the ore.

THE United States Government offers no "bonus" for the discovery of tin. The latest regarding development of U. S. tin deposits is on page 143 of this issue.

THE specific gravity of osmium is 22.447; gold, 19.265; lead, 11.369; iron, 7.79; lithium, 0.594. Besides being the heaviest, osmium is the most infusible of metals.

TO HARDEN copper by any other treatment than hammering does not seem practicable, though alloys of copper can be made much harder than the metal itself.

UTAH supplies about 50% of the pumice stone in domestic use, the product being prepared in Chicago. There is a duty on the imported article of $6 per ton.

TO SOFTEN hardened or chilled cast iron, heat the piece red, then drop a bit of brimstone the size of a pea where the hole is to be drilled; let the iron cool slowly.

THE latest authentic information regarding Siberian mine exploitation can best be secured from the Russian Consul, V. A. Artsimovitch, Safe Deposit Building, San Francisco.

BY melting together 100 parts silver, 3.5 parts iron and ½ part nickel a compound is obtained which, by cooling in cold water, becomes hard as glass, and in hot water hard as spring steel.

THE U. S. standard gallon contains 231 cubic inches. This amount of water at 60° F. weighs 8⅓ pounds. Raw linseed oil, with specific gravity 932, should, therefore, weigh 7.766 pounds to the gallon.

A "STELLA" is a $4-gold piece coined at the Philadelphia mint in 1876. It contains 6 grains gold, 1000 fine, 7 parts copper, 3 parts silver. About 500 were coined, and they are worth about $5 each.

THE total shipments of Lake Superior iron ores during the year 1900 amounted to 19,121,393 gross tons. The largest producing mine in that region last year was the Fayal, in Minnesota, 1,252,504 tons.

THE Standard Electric Co. of California line distance from the Blue Lakes plant on the Mokelumne river to Stockton is 43½ miles; the aluminum wire used is 294 mils diameter and weighs 419.4 pounds per mile.

DENSE SMOKE per ton of fuel emits from ten to twelve pounds soot. Of this one-half is carbon, the remainder 40% unconsumed hydrocarbons, 8% ash, 2% moisture. No smoke is produced in an atmosphere of oxygen.

AS TO WHAT shall constitute a proper marking of a mining location, it may be said that in the absence of Federal, State or local regulations it would be safe to put a monument on every corner, and two more on the vein.

CONVERTERS used on copper matte vary in size, from 5 feet diameter, 9 feet high, in Montana to 8 feet diameter, 16 feet high, in Mexico. Smaller converters are preferred by smelter men as securing better economy of operation.

SHAFT No. 5 of the Tamarack, Mich., Copper Co. is the deepest mine shaft in the world. The shaft was begun Aug. 7, 1895, and on Dec. 20, 1900, cut the lode at a vertical depth of 4662 feet; on Jan. 1st, 1901, the shaft was 4680 feet deep and had cost $663,508.

FOR the common, ordinary, rough-and-ready prospector's assay the California gold pan is about as good as any device, affording opportunity for fairly approximate estimate of the value per ton of gravel or crushed rock, in the hands of an experienced operator.

UNTIL patented, the title to a mining claim vests in the United States, and, hence, the claim is not, in law, subject to State or county taxation. The claim of the county assessor is that he doesn't tax "the mine," but "only the locator's possessory right therein."

THE bromine test—macerating the powdered coal in bromine water—affords the most convenient, rapid and accurate means of determining the tendency of coal to spontaneous combustion, but must be done by or under direction of a competent chemist or analyst.

THE most authentic news procurable is weekly published concerning mining districts and the mines therein, but it is not practicable to give advice or opinion as to the merit or future of special mines or prospects. But where fraud or trickery is manifest, the fact is promptly noted.

NON-EXPLOSIVE POWDER, which does not explode but burns slowly with a hissing noise, contains three parts potassium nitrate to one part of sodium nitrate. The powder is mixed in the following proportions: 56.22% potassium nitrate, 18.38% sodium nitrate, 9.7% sulphur, 15.7% charcoal.

THE aerial wire rope system of transportation has in many isolated cases satisfactorily solved that problem and made profitable the milling of low-grade ores. In the one county of San Juan, Colo., there are 72,470 feet of such line now in successful operation, and about 15,000 feet more is projected this year.

IN the Provo-Mercur, Utah, electrical transmission 40,000 volts are used. The highest California transmission voltage at present is 33,000 over an 82-mile line to Los Angeles, though, as stated editorially in last week's issue, the Blue Lakes Co. propose ultimate transmission of 50,000 volts, 140 miles to San Francisco.

THE composition of air is 79 volumes nitrogen to 21 volumes oxygen, so that the air required to furnish oxygen for the complete combustion of coal gas in a gas engine is $215 \times \frac{7}{21} = 8.1$; 1 cubic foot gas requiring 8.1 cubic feet air. In the ordinary gas engine about 20% of the total cylinder volume of products of combustion are retained.

IT is true that the cessation of silver mining has lessened the demand in that line for quicksilver, but mechanical and chemical arts have become great absorbents of that metal and the general demand does not diminish, while there is a steady yield of quicksilver from California and new territory promises to supply any diminution from the older properties.

THE Rand, South Africa, mines may be resuscitated by July 1st. The gold output for the first nine months of 1899 was £14,707,906; on that basis the uninterrupted output of that entire year would have been £19,500,000. The loss sustained by the Transvaal gold mining companies may not exceed, directly, $40,000,000, but the indirect losses and damages to be recouped therefrom by the Government will probably aggregate considerable.

THE weight of water in a pipe may be approximately estimated as follows: Square the diameter in inches and the result will be weight of water in pounds for each yard of pipe. This rule is also, of course, applicable to circular tanks, if vertical. For instance, the weight of water in a circular vertical cistern 10 feet diameter with 8 feet, or 2⅔ yards water in it, will be $120^2 \times 2\frac{2}{3} = 38{,}400$ pounds, which result is about 5% less than the actual weight of water at 60° F., but 3% more than the weight at 212°.

THE voice one hears over the telephone is not the voice of the person who is talking; it seems exactly like the real tones, drawn out thin and small and carried from a long distance by some mechanical means, but it isn't. When one speaks into the instrument a little diaphragm like a drum head begins to vibrate and each vibration sends a wave of electricity over the wire. These waves set up a mimic vibration in another diaphragm at the opposite end which jars the air and produces an imitation of the original voice. The result seems like the real thing, but is merely a first-class counterfeit.

THE gasoline engine is essentially the same as the gas engine, the main difference being that the former uses liquid fuel which is turned into gas just before being drawn into the cylinder. The consumption of fuel in a gasoline hoisting engine is in proportion to the number of foot pounds lifted in a given time, basing the calculation on one-tenth of a gallon of gasoline to each horse power exerted per hour. Using the tank system for water circulation around water jacket and valve chambers on a continuous 40 H. P. load, the evaporation of water would be about twenty-two gallons per twenty-four hours.

THE warning complained of by "Silex" in a Washington paper for miners to "keep away" may be based on the best of reasons. Whenever there is a discovery, big or little, in a new mining camp many men run there, expecting something to do, and it is but kindness for a local paper to warn them away. Probably skilled miners would have no difficulty getting work there or anywhere else, but "Silex" doubtless knows that the surplus population in new mining camps has a large percentage of men who claim to be "miners," but are really only hangers-on. As a matter of fact, a man who wants to learn something about mining would do better to go to an old mining camp than a new one.

MANY gasoline engines conduct the gasoline in liquid form to the mixing valve of the engine, at which point it is atomized by the inrush of air into the cylinder on the charging stroke. The feeding of gasoline to the engine may be accomplished by gravity or by a small pump. The latter method is considered safer, as it permits the placing of the supply tank at a lower level than the engine. Galvanized pipe is considered best for the supply and return pipes connecting the engine with the tank, the joints to be soldered and made perfectly tight; if black pipe only is available joints should be packed with some substance not acted upon by the liquid. Soft soap and flake graphite, well mixed, constitute a very good packing for such purpose, and make a good lubricant for the small feed pump. Pipes should be drawn up very tightly, and, if possible, tested thoroughly with air pressure before they are filled with gasoline.

THE thermo-hyperphoric process is an Australian invention, and its originator, Jos. Campbell, so far as is known, has not succeeded in making it a commercial success. Its principal feature is the passing of water-gas—a mixture of hydrogen and carbon monoxide — through the roasting ore at a temperature of 2000° F. The ore is first crushed to about a ¼-inch mesh, then roasted in an automatic sealed furnace, and, while roasting, the water-gas is passed through it. The claim of the inventor is that "refractory" low-grade ore can be treated at a total cost of $1.50 per ton with 90% to 95% gold extraction. The results, so far, do not seem to justify the correctness of the claim.

IN cyanide work the velocity of the percolating solution is of import. The highest rate of solvency of gold and silver is accomplished when the speed of the solvent is just sufficient to remove the film of saturated solution around the precious metal particles as fast as it forms. The superficial area of these particles has, however, much to do with the matter. The maximum velocity of solvent at which the maximum rapidity of solution can be effected is something that must be individually determined in the case of each particular ore. This velocity differs for silver and gold. Leaching at the proper velocity for the gold, and, subsequently, at a different velocity for the silver, gives the greatest percentage of total extraction.

A FILE, to do its work fast and well, should be kept free from its cuttings. Cuttings "pin" when they lodge so finely that they can not be removed with a brush. Pinning may be obviated by chalking the surface of the file, but this has the effect of reducing its bite. A little oil on the file will frequently reduce the tendency to pin. It should be used, however, only on the fibrous metals, as it glazes the surface of the non-fibrous metals, making them harder to cut. Chalk is usually applied to a file when a smooth, fine work surface is desired. The effect of the chalk is to prevent the teeth from cutting as freely as when it is not used, and thereby produces about the same result as would occur if a finer cut file had been used. When oil has been used on a file it can be readily removed by thoroughly chalking and brushing two or three times, as the chalk soaks up the oil and leaves a dry surface.

SOME bullion buyers use two crucibles in melting, the inner one of the Battersea make, the outer of black lead. This practically eliminates risk of loss by breaking. Both should be well tempered before applying a melting heat. The amalgam should be well cleaned of sulphide matter or the bar will be covered with a matte, and must be remelted and refluxed. If, after dipping the skimmer into the slag, it should be cooled in water, it must not be dipped again into the crucible until perfectly dry, or the sudden conversion of water into steam will cause an explosion sufficient to scatter bullion about and endanger the operator's eyes. Pour the melt when at a high heat, and, to get a good sample, bore it with a ⅛-inch twist drill to the depth of ¼ inch at several points. This furnishes a better sample than chipping. The crucibles and slag may be pulverized and panned, whereby there is no loss through them; but crushing the slag in an ordinary hand mortar should not be attempted, as the particles will give serious difficulty if they get into one's eyes. Also, burn the canvas or ticking in which amalgam is squeezed, and pan the ashes. One large bullion buyer does not skim his meltings, claiming by so doing to save his customers from all loss in slag. Where gold is from sulphide ores this buyer uses potassium nitrate crystals as an oxidizing agent, and borax glass as a flux; then pours without any skimming whatever. If the bar is still base the operation has to be repeated until the result is satisfactory. Careless skimming may easily take up gold.

PROBABLY the procedure at the Utica, Cal., mine may answer the Sumpter, Or., inquiry as to clean-up of copper plates. At the Utica mill the head plates—that is, the first 8 feet at the upper end of each sluice—are raw copper; the remaining 14 feet are plated with 2½ ounces of silver to the square foot. The plates are cleaned every morning, two men usually working together and each taking a plate on adjoining batteries. A plug of soft wood is driven into one of the 3-inch holes in the cast iron apron, causing the pulp to run through the trough and out through the other 3-inch hole on the other plate. The plate they cut off is first washed with clean water, to remove all sand, then sprinkled with quicksilver, and then rubbed with a whisk broom, to loosen as much amalgam as possible. Every five or six days a weak solution of cyanide of potassium is used in dressing the plates. Great care is exercised in applying cyanide to amalgamated plates, for if too much is used they become hard and glassy. After the plates have been thoroughly treated with the whisk broom, they are rubbed downward with a piece of 75% pure indiarubber gum, ½ inch thick, 4x7 inches in size. The amalgam is then taken up, together with all the sulphurets that may have adhered to the plates during the run of twenty-four hours. The plate is then lightly sprinkled with quicksilver at the head, as the case may require, and lightly brushed with the whisk broom for the full length. The last plate is always brushed upward from the extreme end, so that, in case any amalgam should be hanging to the edge of plate, it will be brushed up to where it can be readily seen and picked up.

Questions and Answers.

What is necessary to locate and hold a mill site location in connection with a quartz claim? T. G.
Gazelle, Cal.

The mill site must be on unoccupied non-mineral land and may join the side lines of a quartz claim if the land on which the site is located is non-mineral. To avail one's self of the provision of law permitting the entry of mill sites, any one holding the possessory right to a vein or lode, and to a piece of non-mineral land not contiguous thereto, for mining or milling purposes, not exceeding five acres, may file in the proper land office application for a patent, under oath, with plat and field notes, to include and describe, in addition to the vein or lode, such non-contiguous mill site, and after due proceedings as to notice, etc., a patent will be issued conveying the same as one claim. The owner of a patented lode may, by an independent application, secure a mill site if good faith is manifest in its use or occupation in connection with the lode and no adverse claim exists. Where the original survey includes a lode claim and also a mill site, the lode claim should be described in the plat and field notes as "Survey No. 37, A," and the mill site as "Survey No. 37, B," or whatever may be its appropriate numerical designation; the course and distance from a corner of the mill site to the corner of the lode claim to be invariably given in such plat and field notes, and a copy of the plat notice of application for patent must be conspicuously posted upon the mill site as well as upon the vein or lode for the statutory period of sixty days. In making the entry no separate receipt or certificate need be issued for the mill site, but the whole area of both lode and mill site will be embraced in one entry, the price being $5 for each acre and fractional part of an acre embraced by such lode and mill site claim. In case the owner of a quartz mill or reduction works is not the owner or claimant of a vein or lode, the law permits him to make application therefor in the same manner prescribed herein for mining claims, and after due notice and proceedings, in the absence of a valid adverse filing, to enter and receive a patent for his mill site at $5 per acre. In every case there must be satisfactory proof that the land claimed as a mill site is not mineral in character, which proof may, where the matter is unquestioned, consist of the sworn statement of two or more persons capable, from acquaintance with the land, to testify understandingly.

In the case of Hartman vs. Smith, Montana, 19, the decision of the court was that: "All that is necessary to make the claim of a mill site by the owner of a non-contiguous mining claim valid, is the reasonable use and occupation thereof for mining purposes in connection with a mining claim."

I want a method to enable me to scorify a cupel without a muffle—something that will give a gold assay with less time and effort. T. D.
Idaho Springs, Colo.

Eight columns, with several illustrations, were given in the issues of July 9 and 16, 1898, to that subject, being a monograph on "Scorification and Cupellation Without Muffle—a New Furnace and Method for Gold and Silver Assays," by G. A. Koenig.

The vein I am following runs out of my ground under land to which there is an agricultural patent or timber land patent, I forget which. Now, can I keep on or must I stop at the limit of my claim? S. H.
Baker City, Or.

The operator of a mining claim to which he has a patent has a right to follow the dip of the vein under and through agricultural or timber land, if his is the senior title; that is, if his patent antedates the patent or possessory right of the adjoining agricultural or timber land. But if the patent or possessory right to the agricultural or timber land is of a date preceding that of the mining claim, the owner or operator of the latter has no such right.

In your issue of Feb. 16th you say that proof of the annual work upon a mining claim must be filed with the county recorder. I don't believe that. The law was repealed by the Legislature in 1897. Please correct.
Redding, Cal. G. T.

The statement does not need correction, but G. T.'s assertion does. The law concerning mining locations passed in 1897 was repealed in 1899 (and re-repealed in 1900), but the law of 1891 was not repealed. That law is in force, requiring that within thirty days after the time allowed by law in which to do the annual work upon an unpatented mining claim in California shall have expired, an affidavit particularly describing the labor and improvements and value thereof must be filed in the office of the recorder of the county in which the claim is. In case of failure to do so the law says that "the claim or mine shall be open to relocation."

How are the filaments made that are in incandescent electric lights? I am told here that they are made of thread. J. D.
Portland, Or.

Sometimes they are made of cotton or silk thread. Where cotton thread is used it is usually parchmentized, first by dipping in dilute sulphuric acid and then washing and drying. The thread is then wound on a form of carbon or other refractory material of the same section as the finished filament is to have, and then packed with other forms in a case with carbon dust and baked at a very high temperature. After the thread has been thoroughly carbonized it is introduced into the lamp bulb, the latter is exhausted of air and the current turned on. This is always done before the lamp is sealed off in order to get rid of occluded gases. It also usually goes through what is known as the "flashing" process, which consists in subjecting the filament at a white heat to an atmosphere of hydro-carbon gas. By this process the filament is made more uniform in conductivity by reason of the deposit of carbon upon the more highly heated and therefore thinner or weaker portions, due to the decomposition of the hydrocarbon.

In this section, when we want to swear in a witness in court, in the absence of a Bible, we swear him on a copy of the MINING AND SCIENTIFIC PRESS, and everything it says is law and gospel; but, occasionally, we see something in it that seems hard to believe. For instance, in your paper of Feb. 16th, you say, in "Concentrates": "It is possible to frame a block of such shape that it will fit either a round, square or triangular hole." Now that rather gets us, up here. We don't say it isn't so, but would like to have some explanation of the how and why of it, if so it is. R. B.
Silverton, Colo.

The statement as made was in answer to a question from Chapultepec, Mexico, asking if such a block could be framed, being a two-line affirmation of the matter. The question is of easy determination, but is worth some detailed discussion. The proposition may be put as an assumption that such a block may be framed, and then will come the question: "What is the shape of the body that will fit into a round, square or triangular hole?" Let us see. It must fit any one of these three different-shaped holes. In Fig. 1 appear a circle, a square and a triangle; looking

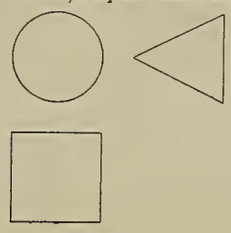


FIG. 1.

at them from the standpoint of a mechanical draughtsman, it is evident that the body formed to fit any one or all three of these shapes must have a plan of a circle, its side view must be square and its end view

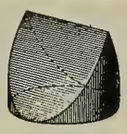


FIG. 2.

must be a triangle. Fig. 2 furnishes a perspective view of such a block so framed as to fit. Fig. 3

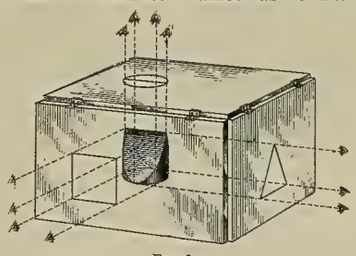


FIG. 3.

is designed to show that the projections of Fig. 2 are in exact accord with the requirements as shown in Fig. 1, and that such a shaped body will fill all the requirements of the problems viewed by the eyes; from above it would appear circular; from the end, triangular; from the side, square.

There appears to be undue consumption of cyanide in one or two plants in this vicinity, and suggestions as to the cause of abnormally high cyanide consumption would be in order.
El Oro, Mexico.

Manifestly but little can be said, and that little only in the most general way. Individual knowledge of local conditions and the nature of the ore is needed to state anything specific. The cause of high consumption may be determined by proper analysis of the cyanide solution. Place 100 grammes of the pulp in a wide-mouthed bottle, add 200 c. c. of the cyanide solution and agitate for fifteen hours. Filter; take 20 c. c. of the filtrate (equivalent to 10 grammes of ore) and evaporate almost to dryness in a porcelain dish. Add some strong sulphuric acid, evaporate almost to dryness and cool. Dilute with water, add some hydrochloric acid, and heat to effect solution, if necessary. The metal in solution may now be determined by the usual laboratory methods. It is to be assumed that the proper preliminary treatment is given the ore. Alkaline treatment precipitates the hydrates, which are then inert toward the potassium cyanide. For every part of the cyanide rendered inoperative a corresponding proportion of metal enters the solution. For instance, one part by weight of iron consumes seven parts by weight of potassium cyanide, etc.

Where and how can I get the publications of the State Mining Bureau? I am unable to get them from the Bureau itself, that ought to have them on hand.
Quincy, Cal. J. J. R.

Some of the publications are out of print, the supply having been exhausted. If you write to the State Mineralogist, San Francisco, specifying precisely which ones you want, you will get them, if on hand, and, if not, will be so notified. There has been no money available for printing for the California State Mining Bureau for four years, but the last Legislature appropriated $7000 for printing and $3000 for reissue of certain publications that were speedily exhausted when first issued.

What did the last California Legislature do with the office of State Debris Commissioner? R. O.
Grass Valley, Cal.

Continued it and cut the annual salary from $3650 to $600.

Kindly tell me through your paper what demand there is for empty mercury flasks, made of iron, weighing about fourteen pounds, being about 4 inches diameter and 12 inches high, not including the neck that is fitted with a screw plug? What are they worth per thousand? How and where can I sell a large number of them? What would they cost delivered at San Francisco, and what could I get for them there? Where are they made and bought, how carried, and what is their first cost? A. J. L.
Central City, South Dakota.

This question has been the subject of considerable inquiry in an attempt to answer it. Five letters were written. The answers received are condensed below. Probably they give as complete reply to the question as can be had:

No. 1. I have never paid any attention as to what becomes of the empty quicksilver flasks, but here they are mostly thrown on the dump or iron scrap pile. In a few instances they may be returned to the company from whom they were purchased. In many instances they are thrown in a pile and never thought of again. Nobody here wants them.

No. 2. Empty flasks are not returnable by the purchasers of quicksilver. All the quicksilver mining companies in California purchase only second hand flasks, which are imported from China and cost, f. o. b. San Francisco, 25 cents each.

No. 3. All quicksilver flasks used on this coast for the past twenty years are "second hand," having been refilled many times. We obtain the larger portion from New York and China, where they are picked up by dealers. A small quantity comes from the mining sections. They are laid down in San Francisco for 25 cents to 30 cents, depending upon freight rates. Before being refilled they are tested for leakage and carefully cleansed. They are made of wrought iron.

No. 4. Our quicksilver mines have for years been supplied with old flasks, coming mostly from China. These flasks were delivered to us in San Francisco at from 25 cents to 28 cents each. They were required to be in good condition and have stoppers. The Chinese store their empty flasks for the purpose of sale, while in this country the flasks, as a rule, are tossed out on the dump and exposed to the weather, so that in a very short time they become unfit for use again. We had not purchased any new flasks from 1887 to 1898. Those new ones came from Pittsburg and were made from wrought iron tubes, the top and bottom being welded on. They cost new at that time, with stoppers, $1.25 each. If your South Dakota correspondent will communicate with any of the larger quicksilver mining companies, agreeing to deliver at San Francisco his flasks in good condition, with stoppers, he might be able to negotiate a sale.

No. 5. If the South Dakota man has several thousand empties, he would temporarily overstock the local market. If his flasks are usable—that is, in good condition and supplied with stoppers—he might get say 20 cents each for them. The freight on them from Deadwood to San Francisco in ton lots would be $2.80 per 100 pounds, or 35 cents each laid down, probably less in carload lots.

Could an inexhaustible supply of limestone carrying an average of 4% aluminum be worked at a profit? S.
Battle, Wyoming.

No.

What is the principle of the dry washer? Where can it be best used and how does it work? Does it need much skill to run? Where is it made? T. V.
Rossland, B. C.

Wherever it is impossible to get water for placer mining, and the conditions are such that a dry washer can be used, such an apparatus is employed. The device is based upon the same principle as a "fanning mill." It is used in southern California, Arizona, New Mexico, West Australia, and in general wherever there is surface placer gold and no water. There are different styles of dry washers in use in many desert mining regions. One general description fits them all, since their difference consists merely in peculiarities of adjusting their several constituent parts, as the angle of the apron, mesh of screen, height and number of riffles, etc. Essentially

it consists of a strong wooden frame, to the bottom of which is attached a bellows, the top of which forms the riffle board, consisting of wire netting covered by canvas, across which the riffles are nailed. Above the riffle board is the apron, and above it the screen. A crank and gear sets the bellows in motion and, by percussion, gives a shaking movement to the apron. While one man is turning the crank another shovels the pay dirt into the screen, through which it falls on the apron and from it on the riffle board. The intermittent blast blows the light particles of dust and sand away, while the heavier ones, and with them the gold, are caught by the riffles. After a number of shovelfuls of dirt (from 50 to 100) have been run through the machine the riffle board is taken out, the larger particles of gold are picked out by hand and the rest is dumped on a sheet of canvas, to be once more run through the machine at the close of the day, or when a sufficient quantity of the concentrated pay dirt has been collected. Such a method entails loss; still, it has been demonstrated that experienced men can save, under certain circumstances, up to 80% of the gold contained in the material worked. It does not take much skill to operate one. Any advertiser of general mining machinery can furnish one if desired.

What is added to blue print solution to insure better result? S. F.
Baker City, Or.

Some photographers add to the sensitizing mixture five drops of a 10% solution of bromide.

I saw a statement in some paper some time ago that where a placer mining claim was located in accordance with the legal subdivisions it was not necessary to mark lines and set stakes and erect monuments. Is this correct? J. W. E.
Josephine, Cal.

The most recent ruling of the Interior Department on this question is that where a placer claim is on unsurveyed lands and conforms to legal subdivisions no additional survey or plat is required when application is made for patent. It is, however, necessary in all such cases to make full compliance with all other requirements not specifically exempted.

I want some reliable information as to scrip for oil lands and, in general, titles thereto, and am told that your paper is authority thereon. F. O.
Bakersfield, Cal.

The subject is an extensive one. Probably the best thing would be to read "Scrip and the Law of Title to Oil Lands," a monograph written by an expert mining lawyer for this paper, and which appeared in the issues of April 7, 14 and 21, 1900. It takes up the whole subject in detail, explains it and gives the exact law regarding it. The article contains about 10,000 words and is authoritative. The matter is one of present litigation and is under argument this week at Washington, D. C., before the Interior Department. It will probably never receive final settlement till decided by the Supreme Court of the United States.

Where and how are the black diamonds or borts mined such as are used in diamond drills? What is the difference between the two? What are they worth and who sells them? J. De V.
Santiago de Costa Rica, C. A.

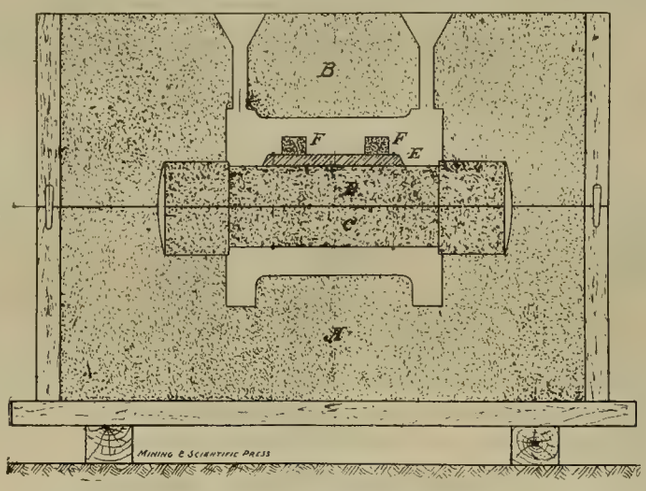
Black diamonds are found in the province of Bahia, Brazil, and are divided into two varieties, carbons and borts, the first occurring in irregular crystals, with granular structure and no distinct cleavage, hardness as great as that of the diamond, density inferior on account of porosity, resinous luster, grayish or black in color. The bort is spherical and without the irregularities shown by the carbons; it is grayish or black, translucent, taking the form of round masses with a rough or crystalline structure. The demand is constantly increasing and the price remains high. The region where the black diamonds are found is about one day's journey from Bahia by boat to San Felix and by railroad to Bandeiro de Mello. The most productive region is found beyond the river Paragason. On account of the primitive methods of extraction the only places from which they are taken are the bed of the river and its tributary, the San Antonio, and from the sides of the Sierra des Levras. The carbons are found in a kind of gravel consisting mainly of quartz pebbles mixed with ferruginous clay and resting on a clay stratum. A spot is chosen in the bed of the river where it is not more than 20 feet deep and where the current is slack. A long pole is planted, down which the native descends, provided with a sack whose mouth is stretched open by an iron ring. The clay is scraped from the bed of the stream and the sack filled with gravel. It is brought up and taken to the shore, the sacks being stored out of reach of high water. This operation is carried on each day for the six months of the dry season. During the rainy season the search is suspended on account of the current and the great depth of the river, and the gravel is washed and examined for carbons. The parts of the river having great depth are not worked. Here dredgers or diving apparatus might be used to advantage. Another method of extraction consists in perforating the sides of the mountain along the shore. A number of tunnels have been made for the extraction of gravel containing diamonds and carbons. The work is carried on during the dry season and in the rainy season the gravel is washed in cradles or by similar methods. The carbons are found in dimensions varying from a grain of sand to crystals weighing 975 carats. The largest was discovered in 1894 and sold at Paris for for $20,000. The size preferred is that weighing from one to three carats, as the large masses must be broken, with considerable loss. The carbons in rock drills are disposed on a steel crown in circles or rows.

Will you please answer for me these two easy questions? How can I connect telephones to a 230-volt direct-current lighting circuit so that they will work satisfactorily while the lights are on?

No. 2. How are tappet gibs made, and why are not they interchangeable between tappets of the same size?
Hedges, Cal. G. F.

Those questions are not "easy." It took some effort to properly produce answers. Answering the first question, it would not be possible to connect up a commercial telephone apparatus on a circuit carrying a 230-volt direct current of electricity. The receiving telephone is equipped with a spool of No. 36 silk insulated copper wire; this will fuse in five seconds with a 2½ ampere charge, which is the quantity that would be forced through 90 ohms under 230-volt pressure. The bridging bells now used on telephone circuits have 1000 ohms resistance and ¼ ampere would be forced through. These spools would take fire in about twenty minutes.

In reply to question No. 2, the tappet for the stem of a stamp battery is made as follows: The pattern of the tappet is rammed up in sand enclosed within a box called a flask, the bottom portion, A, (see illustration) being called the drag, and the top portion, B, the cope. After the pattern of the tappet has been withdrawn, the core C-D, with the iron gib E wired to it, is placed in the mold; the cores F F are then put in place, the flask closed and the metal



poured in. The reason why the tappet keys which go into the openings left by the cores F F are never alike is as follows: The core C-D, which is made up of dry sand, is made in two halves and pasted together: this operation very rarely, if ever, produces two cores exactly the same diameter, and as this diameter determines the distance from center of tappet to back face of gib, it will be seen that the depth of the key opening F is greater or less as the diameter of the core C-D is greater or less. While it might be possible to make the core C-D of standard size, this would not overcome the difficulty entirely, as the molten metal when poured into the mold generates gases that cause disturbance sufficient to destroy exact measurements and render it impossible to make keys duplicates of each other.

Can you inform us of any plant in operation where the tailings from a concentrator containing native, ruby and antimonial silver to the amount of ten ounces or less to the ton are treated successfully? If so, kindly give the desired information. F. G. J.
Neihart, Montana.

At the Minnesota mine, Chloride, Mohave Co., Arizona, an almost precisely similar problem is to be undertaken by Manager E. T. Loy, who says he will put in pans and settlers. He is now preparing for the treatment of just such ore, and his experience may be of interest and value. Some extended reference to this matter appeared on page 136 of the issue of the 16th inst.

We have over 500 pounds of nitro powder (40%) here, which was manufactured in 1898; it has been in our powder house for over two years. The powder got wet many times and was thawed out during summer; it is full of white crystals and blisters and some sticks have increased one-third in size. Will this powder be more dangerous to handle and use in a mine than fresh powder? Will nitro-glycerine evaporate at ordinary temperatures and the residue be non-explosive?
Summitville, Colo. C. L. G.

The white crystal is nitrate of soda, and from the description there is doubtless considerable nitro-glycerine on the outer side of the paper. Not alone is the powder dangerous, but it is of no practical value as an explosive, as its power has been very considerably reduced, probably 60%, and the best thing our correspondent can do with it is to dispose of it—throw it into some abandoned shaft or burn it up by means of fuse and cap. If dynamite is confined in a very close place and it is extraordinarily hot—say, the temperature from 90° to 100°—it becomes sweated and loses in strength. In handling this powder the utmost caution must be observed in disposing of it, as no doubt the cases in which it has been placed are also saturated with nitro-glycerine, and if he scrapes it against the buttons of his coat or the side of a wagon it is liable to explode.

Tell me the horse power necessary to operate a Hartz jig of two compartments and also of four, under different conditions of stroke and speed and classes of ore. I am unable to get any information in technical books on this subject. B. H.
Lead, South Dakota.

It is not possible to give exact answer to so general a question, as individual or local conditions largely determine those things; but, based on experience, it requires about ½ H. P. for a two-compartment jig and 1 H. P. for a four-compartment jig. Of course, this depends somewhat on the character of the ore bed on the screens, also upon the weight of the ore, some ore being much heavier than others.

Is not 10 feet of work sufficient to comply with the annual assessment law for work on mining claims? I hold that it is. S. T. T.
Lake City, Colo.

The law requires $100 worth of work, and not any number of feet. In several Colorado districts it has become customary to call 10 feet sufficient compliance with such law, but the federal law is supreme, and, if required, the holder of an unpatented mining location must be able to show work or improvements to the extent of $100 for the year. Not to do this is a risk. Of course, if he does only $5 worth of work or none at all, he can go on if no one gives him trouble, but in case of dispute $99 worth of work would not count if the matter were brought within the strict letter of the law.

Can you tell me of any practical method for saving platinum when the same is associated with fine gold in placer ground? We concentrate the platinum all right with the gold, but final amalgamation of the gold does not save the platinum. F. S. C.
Minidoka, Idaho.

Platinum does not amalgamate. It can be separated from fine gold by amalgamating the gold, working out any platinum the amalgam may hold mechanically, and finally washing the platinum, to free it from sand, sulphurets, etc.

Assayers who have handled platinum separate the free gold by amalgamation, and say, where any platinum is held mechanically in the amalgam, it can be separated by working it by hand, when the platinum will come to the surface and can be separated. The platinum can afterwards be separated from the sand or other foreign material by panning, the same as free gold can be separated from quartz or sand. We do not know of any mechanical plant for concentrating platinum from sands, the only method to be pursued being to pan it out by hand.

I have heard of some contrivance used in northern California for cheap working of placer claims, a kind of scoop or primitive dredge. Can you give any information from this meager outline? A. R.
Bannack, Montana.

Probably is in mind a device used by gravel miners in Siskiyou Co., Cal., in working gulch and creek bed claims where there is deep bedrock. It is, briefly, a scoop guided by a slanting cable, extending about 150 feet to bottom of diggings, 30 to 50 feet deep in an open cut. In successful cases the plan dispenses with a pump or derrick, scooping up gravel and water, about a ton a load, one man at the engine and two in the cut, but it is only applicable in a small way and is not in general use.

I want a simple test for copper in ore, not one of those elaborate laboratory tests you occasionally print, but something I can use right on the trail without any apparatus. M. V.
Wickenburg, Arizona.

Crush the ore sample; grind it very fine, make pulp of it, roast the pulp; then mix and well knead into bulk for bulk of salt and candle grease or other fat, and throw it into the fire; this last is best done at night. If copper is present the spluttering mass will show first blue, then green. For a quantitative analysis or assay you must have apparatus and skill.

A multitude of other questions are more briefly answered, as usual, in "Concentrates," page 145.

Notes on Gold Milling Practice at the Athabasca Mine, Nelson, B. C.*

A casual inspection of the ore on the floor of the breaker room would create the impression that the ore is not suitable for milling at all. The general features are a hard bluish quartz, containing a large proportion of sulphides of zinc, lead and iron, showing free gold only when the ore is of fair grade, say from $30 per ton upwards in gold values; and then usually closely associated with the lead and zinc sulphides. At times the entire ore body consists of solid sulphides, usually under these circumstances of either iron or zinc. We are not in the habit of making regular analyses of the ore, but in December we took a sample from the ore pulps of the mill runs of December 2nd to December 15th, inclusive: The contents were as follows: Gold, 1.35 ounces to the ton; silver, 45 ounces to the ton; zinc 2.20%; lead, 1.60%; iron, 10.70%; sulphur, 6%; silica, 68.80%; lime, (Ca O) 1.90%; alumina ($Al_2 O_3$) 6%.

The average gold contents recovered in the mill, during last year, was over one and one-half ounces per ton and during the month of June reached very nearly three ounces per ton. A feature of the ore, which assists recovery in the mill, is the free gold imbedded in the zinc and lead sulphides, in samples where no sign of quartz is visible. I have before me a remarkable sample of fine grained galena, 1 inch high, ¾-inch broad and ½ inch thick, which is pierced by a wedge of gold, shaped like an Indian arrow head, ¾ inch long, 3/16-inch broad at the base, tapering to a point at the other end. The mill contains ten stamps, working in two batteries of five stamps each, frame of the front knee type, battery posts 12x25½ inches, knee frames 12x17 inches, girts 12x13½ inches, the whole bolted together in the usual way, cam shaft of steel, 5¾ inches in diameter, fitted for Blanton cams. Ours are arranged in the order of drop 1, 3, 5, 2, 4, and while this plan does not seem suitable to our case, we are unable to experiment with any other style without a new cam shaft. I think it would be an improvement if, in sending out these shafts, the manufacturers should drill them for the wedges, so that the order of drop could be changed. We find that the pulp banks up around No. 1 stamp and this both impedes the action of this stamp and interferes with the amalgamation in this end of the mortar. With a view to overcoming this difficulty our practice is to give the end stamp about ½ inch more drop than the middle stamps. The cam shaft works in open boxes. The guides are individual guides of maple with grain of wood up and down; each guide block held together by two ⅝-inch bolts running across grain of wood, with head and nut countersunk; each pair of guides held in place by two ⅞-inch bolts running through guide rail; a hard wood wedge driven home between each end pair of guides and the battery posts, and secured by a bolt. These guides give excellent service, if care is taken to have the guide blocks thoroughly seasoned before fitting; the cost of renewal is very slight, and they have the inherent advantage of all sectional guides.

The cams and tappets are of steel; latter fitted with three keys; after twenty-four months wear we have not yet had occasion to turn one tappet, and the cams show no sign of wear; they work smoothly and consume practically no grease.

The stems are of steel and we have not yet, after twenty-six months use, had occasion to even turn one of these; bosses or heads of cast iron, shoes and dies of forged steel.

The stamp when new weighs 980 pounds; speed varies from 80 to 115 blows per minute, according to the requirements of the time, with a drop of from 5 to 8 inches.

We stop on the first day of each month to clean up the amalgam in the mortars, lace belts and so forth, which stoppages aggregated last year eight days and seventeen hours; besides these delays we lost four days and twenty hours. Our motive power is entirely water; working under a head of 398 feet. We employ two impact wheels, one a motor 2 feet in diameter, which operates stamps, rock breaker, electric light plant and cyanide plant; the other a 12-inch motor which operates the vanners only, and of which the speed is never changed.

Width of mortar at point of discharge, 14½ inches; height from top of die (when new) to bottom of screen discharge, 6½ inches; die, 6½ inches deep; when the die is worn out, the height of the discharge is as much as 11 or 11½ inches. Screens of diagonal slot pattern; our practice is to employ a 50-mesh screen when dies are new, a 40-mesh screen after thirty days wear, 30-mesh screen when dies are wearing low; a mortar arranged on these lines is not designed to attain high records of crushing; the greatest tonnage which we put through was during the month of January, 1899, when we crushed 713 tons in thirty days, seven hours, or two and one-third tons per stamp per day; pulp after passing over plates is sized in a cone sizer, passes in grades of size to four vanners, first or coarsest grade passing over a 4-foot corrugated belt, the other three grades passing over 6-foot plain belts. Tailings from the vanners have, up to the present time, received no further treatment, but will be treated in the cyanide plant.

COPPER PLATES.—These are arranged as follows: One back plate inside the mortar, 10½ inches by 51½ inches; one chock block plate inside the mortar, 3¾ inches by 50 inches; one lip plate outside the mortar, 8 inches by 54 inches; one apron plate outside mortar, 56 inches by 120 inches. All electroplated one and one-half ounces of silver to the foot; apron plate has a fall of 1½ inches to the foot; just sufficient water is kept flowing over it to keep pulp from banking on plate.

The practice is to dress apron and lip plates five times each twenty-four hours, using as a cleansing solution a warm solution of dilute cyanide and sulphuric acid; plates brushed up with a hair scrubbing brush and smoothed off with whisk brooms, brushed across the plates. Fresh quicksilver is applied before the brushing process in quantity as may be necessary. In this way plates are preserved beautifully soft and clean; amalgam is removed every two days from apron plates, a small piece of rubber being used as a scraper. Every sixth day the screens are removed, lip plates cleaned of amalgam, and all trash and chips cleaned out of the mortars; the chock block plate, and back plate inside the mortar, are only removed and cleaned at general clean-up first day of each month.

The amalgam is cleaned with fresh quicksilver and squeezed as dry as possible. In this condition the amalgam from the plates outside the mortars contains about 20% bullion and the amalgam from the plates inside the mortars from 30% to 45% bullion.

ASSAYS.—At least four assays are made daily:

1. Of the ore at the feeders.
2. Of the pulp as it leaves the last plate.
3. Of the tailings.
4. Of the concentrates.

The sample taken at the feeders cannot be considered a satisfactory sample, but averaged over a period of several days, the results are fairly good. For the year 1900: The average of the feeder samples was $44.38; the average of the tailings samples was $8.71; the theoretical recovery was $35.67; the actual recovery was $33.66.

The theory under which we have been working is that the gold should be given as early and as ample an opportunity as possible to amalgamate, and for this reason we have held to the use of as large plates inside the mortars as possible. For this reason, and in order to preserve the back plate intact, we do not alter the height of the chock block which carries the front inside plate, and in this way the level of discharge is always the same. In this way there is very little tendency to scour the plates, excepting (to a limited extent) around stamp No. 1 where the pulp is banked up by the action of the stamps; and the change of screens, as aforesaid, offsets the increasing height of discharge which is produced by the wear of the dies. After the run of the month of June, we cleaned off the plates inside the mortars, 3183 ounces of amalgam, which produced about 925 ounces of bullion or 64% of all the bullion recovered. During this month our percentage of recovery was 81% of the value of the ore. My opinion is that our loss consists, almost entirely, in the sulphides; and that our loss in amalgamable gold is slight. From June until the end of the year, our percentage of recovery steadily fell to 77.6% in November, corresponding with the proportion of bullion and concentrates recovered:

Month.	Total amount recovered.	Percentage by value of Concentrates to Bullion.
June	81.0%	21.5%
July	80.7%	24.0%
August	79.6%	29.2%
September	79 4%	27.8%
October	78.4%	29.7%
November	77.6%	38.7%

To ascertain what proportion of sulphides were being lost, we sampled and analyzed our ore pulps during December. During this period 230 tons of ore were milled, producing 26.7 tons concentrates which, when sampled, assayed as follows:

Gold	2.67 ozs. per ton.
Silver	6.00 ozs. per ton.
Zinc	5.5%
Lead	4.8%
Iron	34.3%
Insoluble	17.6%

If all the above figures are correct, and 900 pounds of ore should produce 100 pounds concentrates, then

900 lbs. ore should yield 900× 2.2%=19 8 lbs. zinc.
900 lbs. ore should yield 900× 1.6%=14.4 lbs. lead.
900 lbs. ore should yield 900×10.7%=96.3 lbs. iron.

Actual results are:

In zinc we recover 5.5 lbs., or loss of 74%.
In lead we recover 4.8 lbs., or loss of 67%.
In iron we recover 34.3 lbs., or loss of 65%.

The absolute accuracy of these figures is open to question, but I am satisfied that the general tenor of them agrees with our results in practice and they point to a serious need of additional concentration facilities. Our experiments, however, with the cyanide process for the retreatment of our tailings seemed to offer such excellent chances of success that we decided to install a plant of this description and did not further consider the improvement of our concentration plant.

Fineness of bullion varied during last year from 682.5 to 747.5, with an average for the year of 725.3. The fineness seemed to vary as the quantity increased—the bigger the brick the higher the grade. It also seems to vary inversely with the proportion of concentrates recovered.

The number of tons crushed during the year was 5054, which produced 520 tons concentrates, or 10.2% by weight of the ore. The actual recovery in bullion was $25.62 and in concentrates $8.03 per ton; of the values recovered the bullion supplied 76%; concentrates, 24%; the value of tailings, $8.71 per ton; percentage of recovery, 79.4. The tailings have been impounded in a dam pending the completion of the cyanide plant.

An iridescent brass-colored stain constantly forms on the apron plates. I use the word stain because it is so thin and in such a fine state of subdivision that, when gathered up in water, its appearance is that of a dark-colored solution. Fresh quicksilver, when applied to the plate covered with this stain, instantly adheres as readily as though the plate were bright, and it does not seem to interfere with amalgamation in any way. It is instantly removed with the first stroke of the brush, and, when the brushing process is ended, I have seen the stain reappear within fifteen seconds after the clean water has been turned on, before the attendant has time to release the first stamp. We have only made very slight investigation into the nature of this stain. Without more than suggesting that it has any connection with the above, I may here draw attention to the fact that, while the iron sulphides are apparently entirely composed of common iron pyrites, FeS_2=sulphur 53.3% and iron 46.7%, yet in the analyses of our ores and concentrates, we seldom find more than from one-half to three-fourths enough sulphur to satisfy the iron in the formula FeS_2, not to speak of the sulphur necessary to satisfy the zinc and the lead.

A curious feature of amalgamation was noted when the mill first started. Amalgam was formed on the front plates in remarkable quantities which, when retorted, produced an insignificant amount of retorted sponge.

During the first ten days of November, 1898, 1755 ounces of amalgam, squeezed dry, produced 161.8 ounces of bullion, or 9.1%. This had been even more remarkable during October, and the same feature continued during the following three months, after which it became normal.

We make bricks weighing from 400 to 500 ounces each. We use a flux as follows: Borax glass, 100 grammes; bicarbonate soda, 50 grammes; glass, 600 grammes; stir to excess with an iron rod. After skimming the slag, the brick is poured and is found in the mould with a heavy layer of matte on top. This is removed and the brick remelted under the same conditions. This process insures clean bricks in our case. The matte and slag are saved, and, after the product of six months has accumulated, it is retreated in the pot with niter and litharge, and the resultant lead is cupelled. The residues are again treated in a similar manner, which second process removes all the value except traces of silver.

*Condensed from article by E. N. FELL, read before the March, 1900, meeting of the Canadian Mining Institute.

Treatment of Fahlerz Ore.

TO THE EDITOR:—I may say that "C. R. C., Denver, Colo.," may be governed by the quality of the fahlore, to which he refers in his inquiry in the issue of Feb. 23rd. It will depend entirely on the values contained in the ores, and the degree of mineralization—whether the entire mass is impregnated with mineral, or whether there is more or less clear gangue with it, or mixed. If the material is rich enough, I would suggest sorting and shipping to a smelter having suitable flux ores to make a successful reduction.

If the greater part is gangue, which, I believe, is about usual, crushing with rolls to ¼ inch in size, jigged, the tailings from this operation put through a Huntington mill grinding to 40-mesh fine, then concentrated, the concentrates from this, with those from the jigs, shipped to the smelter, and the tailings from the fine concentration amalgamated in Washoe pans, good results may be obtained. This will give more satisfaction than any of the various processes I have tried.

I worked on such ores for a long time, and after many experiments this was found to be the best.

My jig concentrates gave 140 ounces silver, $62 gold, 18% copper and 14% lead, with 11% metallic and oxide of zinc. The fine concentrates varied very little from this; but all concentrates contained practically all the lead, zinc, arsenic and antimony, leaving the tailings from the last operation comparatively free of these base qualities. These tailings contained about twenty ounces silver and $7 gold. This latter material was amalgamated in pans containing two tons each, with thirty pounds salt and ten pounds sulphate of copper to each charge, run hot two hours with chemicals, then adding 125 pounds quicksilver and run five hours longer.

Fahlore slimes considerably. These slimes should be caught in large tanks outside the mill, and, when sufficiently hard, taken into the mill and about 700 to 800 pounds put into each pan charge to make up the two tons.

These slimes contained a considerable percentage of antimony and arsenic, and averaged about ninety ounces silver and $35 gold, making the pan charge average about thirty-two ounces silver and $14 gold

per ton. Extraction from this process averaged 83% silver and 92% gold.

The quicksilver showed tendencies to flour. About an ounce of cyanide of potassium added to the pan about two hours before discharging will have good results. Loss of quicksilver was about six pounds per ton of pulp.

I made many attempts to test the concentrates on the premises by a chloridizing roast and amalgamation; but the loss of gold and silver by volatilizing in the reverberatory furnace would frequently reach 50% of the assay values. J. W. PINDER.

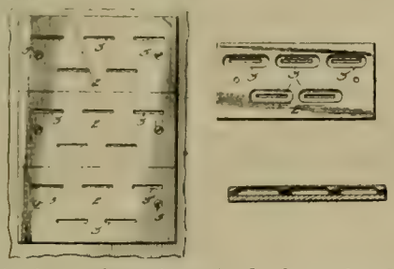
Groveland, Cal.

Mining and Metallurgical Patents.

Patents Issued March 12, 1901.

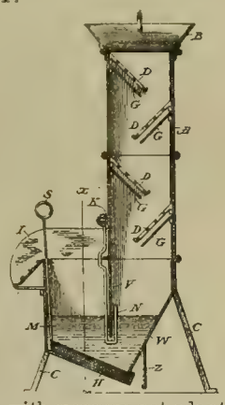
Specially Prepared for the MINING AND SCIENTIFIC PRESS.

AMALGAMATOR.—No. 669,422; O. Maris, Russiaville, Ind.



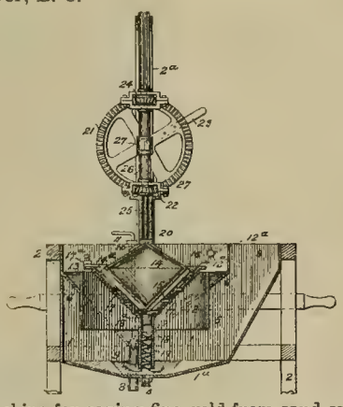
Sluice for amalgamators, etc., having series of parallel, transversely extending plates secured thereon, each plate comprising working plate having longitudinally extending, parallel, alternately arranged, overlapping slots therein, rounded ends to slots, base plate, slotted, flexible material between base and working plate, bolts engaging parts of each sluice plate adapted to bind same together, concave walls to slots in working plate converging toward upper surface thereof, lower edges of walls registering with edges of slots within flexible material.

GRAVITY AMALGAMATOR.—No. 669,671; J. Tobin, Brooklyn, N. Y.



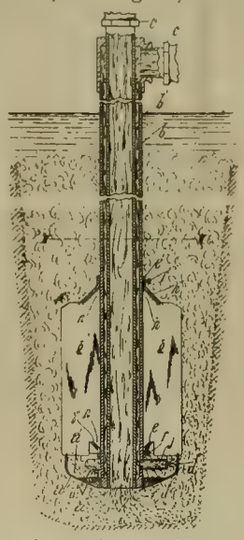
Combination with mercury pot adapted to contain body of mercury, supports therefor, of diaphragm dipping below surface of mercury, extending across pot, dividing it into two chambers, stand pipe covering one chamber adapted to feed pay dirt into chamber, oscillating stirrer pivoted to exterior of stand pipe extending into open chamber of pot, extension on stirrer reaching under diaphragm and above surface of mercury on inner side of diaphragm, pump connections for supplying water to upper end of stand pipe, means for operating stirrer and pump.

GOLD SAVING MACHINE.—No. 669,873; T. Bell, Vancouver, B. C.



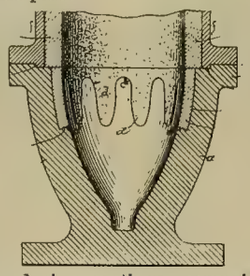
In machine for saving fine gold from sand or pulp; tank having bottom sloping slightly down from each side toward center; V-shaped partition in tank dividing it horizontally into two parts, upper and lower; cylindrical opening in center, cylinder of which forms inner wall to V-partition; conical amalgamator adapted to float within cylinder on water in tank, adapted to rotate therein on vertical axis, means carried by conical amalgamator by which water and pulp are conveyed from lower to upper division of tank; means whereby water and sand are introduced to lower and tailings withdrawn from upper divisions.

HYDRAULIC AMALGAMATING MACHINE FOR EXTRACTING GOLD FROM SAND IN PLACE.—No. 669,911; G. S. Bartholomew, Los Angeles, Cal.



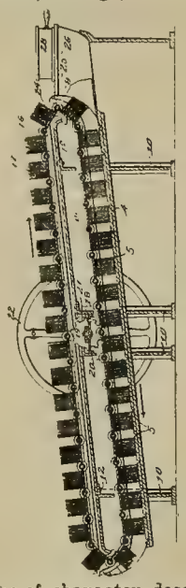
Hydraulic amalgamating machine for extracting gold from sand in place, combination of tube open at lower end; means for forcing water through tube; tube surrounding open-ended tube closed at lower end, provided with lateral openings through walls near lower end; means for forcing water through tube; cup fastened to tube below openings; amalgamating plates extending up and down above openings.

MOLD FOR STEEL CASTINGS.—No. 669,952; W. Brinton, Highbridge, N. J., assignor to Taylor Iron & Steel Co., same place.



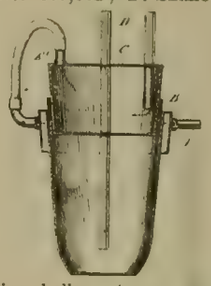
Mold for producing castings, comprising metallic portion to chill contained metal, sand portion to permit more gradual cooling of metal adjacent thereto, an intermediate zone composed of continuations of metallic and sand portions of mold in juxtaposition, both exposed to contact with incoming molten metal, arranged to decrease rate of cooling adjacent metal of casting from chill to sand part of mold.

DRY WASHING MACHINE FOR GOLD.—No. 669,928; L. D. Hubbard, Chicago, Ill.



In machine of character described, bed plate having transversely extending grooves on upper surface for containing mercury, suitable inlets and outlets for grooves, upper track provided with downwardly extending curved ends, lower track having upwardly extending ends overlapping curved ends of upper track, endless brushing apparatus provided with series of brushes pivotally connected together, having wheels carried by pivoted connection traveling upon tracks, means engaging pivoted connection for causing travel of brushing apparatus.

CRUCIBLE.—No. 669,862; P. Shimer, Easton, Pa.



Crucible having hollow stopper, cooling chamber gasket interposed between hollow stopper and chamber, means for connecting stopper with chamber for circulating cooling medium through stopper, overflow of cooling medium passing by connecting means into chamber, outlet for cooling medium from chamber.

The Lunkenheimer "Universal" Hand Oil Pump.

This form of oil pump is preferred by some users to the lever pattern, which the Lunkenheimers originated and have sold for over twenty years. The "Universal" hand oil pump can be made to attach either vertically or horizontally by transposing plug B and shank A, which are interchangeable. As shown in cut, it is arranged for vertical connection.

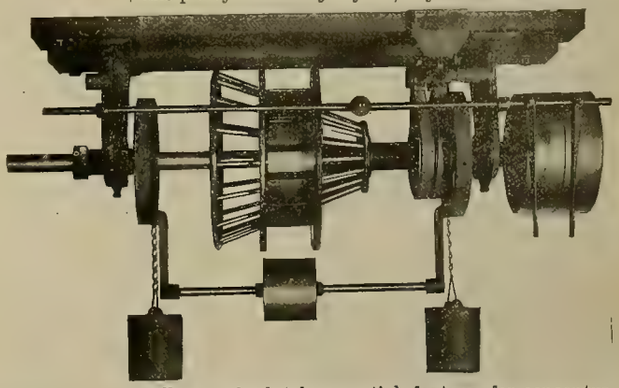
The filling hole is closed by a hinged cap, which keeps out dust and dirt, and, in addition, there is a removable wire gauze strainer to insure clean oil. Where required, these pumps can be furnished with brass instead of glass body, as shown in cut. They are manufactured by The Lunkenheimer Co., Cincinnati, Ohio.

The American Expansion Pulley.

The American expansion pulley has for its most prominent feature a cone of rods loosely mounted on a shaft, to slide laterally along the shaft while same is revolving, this lateral motion spreading apart or contracting, according to the direction of the motion.

The pulley operates singly in countershaft form, with an idler pulley to take up the slack of the belt, as shown in the illustration. At the Allan mill, Idaho Springs, Colo., Herbert Strickland superintendent, has one of these pulleys built into a Wilfley concentrator, and made a part of the same, and another, in countershaft form overhead, operating a Cammett concentrator. He says the pulleys give him absolute control of the speed of his concentrator and effect great saving.

H. E. Wood of Denver, Colo., who has been using this pulley for nearly a year, says: "I consider this



pulley an absolutely essential feature for concentration tables, the improved results being apparent at once." The pulley is made by the American Expansion Pulley Company, Denver, Colo., who will furnish full particulars.

MINING SUMMARY.

Specially compiled and reported for the MINING AND SCIENTIFIC PRESS.

ALASKA.

"Ice in the ocean went out yesterday," says a Nome letter of Dec. 13, "and the sea is clear of obstructions except for a space of half a mile wide along the beach." The coldest weather experienced up to that date was 14° below zero. Nome people hear from the outside world every two weeks, the mail being carried in over the ice that often.

Rampart City during the winter has had a population of 400. Not more than ten of these have made more than wages. Slate creek, on which a strike was made in the fall of 1900, has not developed anything this winter. Big Manook is no better now than it was last fall. Practically no companies have made money on Hunter, Hoosier, Quail, Russian or Gurmett creeks, all of which were regarded as rich in the fall. In May it is expected that at least 200 of the present population of Rampart City will leave for the States, not to return. Fifty more will migrate to other camps.

ARIZONA.

COCHISE COUNTY.

The Calumet & Arizona M. Co. has been organized at Houghton, Mich.; capital $2,500,000. The mines of the company are located at Bisbee.

GILA COUNTY.

The Arizona Commercial Co. has two mining claims at Globe, the Defiance and Copper Hill mines.

MARICOPA COUNTY.

Wickenburg, in the northern part of Maricopa county, is the supply center for a considerable area of mining country both east and west therefrom. Sixteen miles southwest is the Vulture mine, which recently passed into new hands, who are preparing to resume operations. This mine is well known and has an interesting history, and those now in control are expected soon to place it again in the rank of active producers.

West and northwest from Wickenburg, from 50 to 60 miles, are the Harqua Halas, where there are numerous properties which are producers.

But the main purpose of this article is to call attention to the Black Rock district, 12 to 18 miles northeast from Wickenburg, in the Silver range of mountains. This is a little group or range of hills which are separated from the Date creek range on the north by the Hassayampa and from the Bradshaw range on the northeast by Castle creek. This region has been covered by mining locations for twenty years, but not much active work resulted till within the last two or three years. So far as a brief investigation could determine, it may be stated that there are three parallel fissures trending through the district from southeast to northwest, approximately a mile and a half apart, each of which follows the course of a porphyry or diorite dike. These fissures and dikes mark the course of a mineralized zone, bounded by a granite formation. Within this belt is a kind of lime and spar formation, which forms the vein walls, the surface cropping being in an iron gossan. There are, likewise, various cross ledges and veins that are deflections from the main fissures. The ores, carrying copper and gold, are considerably oxidized near the surface, but change to a sulphide at water level. These statements are intended to apply in a general way, bearing in mind that different and varying conditions are to be found as one goes from one property to another. On the east side of the district, drained by the Buckhorn, is Octopus hill, through which the center fissure passes and in which various north and south veins appear to focus. This and the immediate locality is covered by a group of claims belonging to Geo. W. Morgan, who has some development. Farther to the northwest, on the same center fissure, is the Keystone group, located by J. P. Gunther, who recently bonded it to the Keystone Copper & Gold M. Co., who put up gasoline power equipment and who are pushing development. The main shaft is 300 feet deep, the bottom of which is at water level. From the shaft is a considerable amount of drifting on the 100-foot level, which shows an ore body comprising bornite, chalcopyrite and black oxides. The copper herein runs from 2% to 3%, with small values in gold and silver. Here the vein matter is next to the main porphyry dike. Another shaft is also being sunk. As development proceeds, the method of treating the ore is being considered. This particular mine is more specially marked by copper characteristics than others of the district.

On the east fissure is the Groom mine, which is being developed under the management of Geo. W. Middleton for the N. A. Exploration Co. This group covers two ledges, one being apparently an offshoot from the main ledge; the property is being developed by a shaft which is now 400 feet deep that sinks between the two ledges. Crosscuts are being run from the shaft both ways to cut the two ore bodies. The two veins are 350 feet apart. The ore is a copper sulphide, with very little oxidization at the top. The hoist and compressor are operated by gasoline engines. A steam boiler is being put in to add to the present pumping facilities. A strong flow of water has been obtained in the shaft, 30,000 gallons being pumped per day.

In the same locality is the Homestake group, belonging to J. W. Burson. The ledge of copper ore is being opened through an incline shaft which is now 360 feet deep. Near the surface the ore is quite oxidized, with more of a sulphide at greater depth.

Following northwestward on the same belt, toward the point where the Hassayampa divides the Date from the Silver range, we come to O'Brien's camp and a group of claims belonging to F. X. O'Brien, which covers what seems to be a portion of the east fissure and another ledge that has a northeast-southwest trend. The latter is known as the Homestake lead, whereon the principal development is to be seen. The ore body here is from 40 to 100 feet wide, dipping about 35° from the horizontal. The ores here are a free-milling gold quartz, these characteristics seeming to hold to the 350-foot depth of the incline shaft. In evidence of this, Mr. O'Brien operates a 10-stamp mill, by which he saves about 75% of his values on the amalgam plates, the tailings therefrom being cyanided. Contrary to the general characteristics of the district, this indicates the presence of very little base material and no copper. It is stated that there are about 200,000 tons of ore accessible in the mine.

On the west fissure, of the three named at the beginning, is the Ellis group and that locally known as the Standard Oil Co. group. The latter is being developed under the direction of Mr. Burridge of Santa Rita, New Mex., for Eastern people, presumed to be connected with the Standard Oil Co. At present a 400-foot shaft has been sunk, from which general exploration is in progress. At present depth the material on the ledge is pretty well leached and oxidized.

It should be stated, in conclusion, that this Black Rock district is in Yavapai county, though Wickenburg is in Maricopa county.

Wickenburg, March 18.

PINAL COUNTY.

The mine of the Mammoth-Collins G. M. Co. at Shultz is producing about 180 tons of ore per day, which is hoisted from the levels above the 700. From the bottom of the 700-foot shaft a crosscut is being driven toward the Collins group to tap a separate vein on the latter. As soon as the vein is reached by this crosscut an upraise will be made to the old 350-foot workings. A wire rope tramway line, 3 miles long, conveys the ore from the mine to the mill at Mammoth, on the San Pedro. The mill is equipped with seventy stamps, only fifty of which are being operated. The ores are tolerably free milling and no concentrators are in use, though it is said they have been tried, with the conclusion that the ores are not adapted to concentration. That which is not saved on the plates goes out in the tailings, with the expectation of extracting it by cyanide. The mill has been operating steadily for about three years.

The mill tailings are being operated on by two cyanide extraction companies, viz., the Mammoth Cyanide Co., in charge of M. Mendenhall, and the St. Louis Gold Recovery Co., under the management of N. Anderson, who is one of the company. The first-named have a lease on such tailings as have been produced within the last three years and those that result from present operations of the mill. Since beginning two years ago they have cyanided about 30,000 tons. The very complete plant comprises leaching tanks of 350 tons daily capacity, the usual precipitating apparatus and a Robins belt conveyor, run by a 40 H. P. engine, by which the material is carried from the dump to the leaching vats. The capacity of the plant is considerably in excess of that of the mill to produce tailings.

The St. Louis Gold Recovery Co., the chief stockholders of which are Anderson and Peck, have a lease on those tailing dumps which accumulated prior to three years ago, on which their plant has been operating since August, 1898. In that time, Mr. Anderson states, they have cyanided about 160,000 tons of material and perhaps 40,000 tons are still at their disposal. The assay value of these tailings ran $3 gold and one and one-half ounces silver. The extraction amounts to 70% to 80% of the gold and 40% of the silver, the cost of extraction being 76 cents per ton.

In the Mammoth-Collins mine the workings have reached the water level and the operators will soon have to provide pumps for handling the water, and it is possible they may get into sulphides at greater depth, though as yet such ores have not appeared.

Mammoth-on-the-San Pedro, March 13.

The Golden Rule Copper Co., of which W. H. Lake of New York is president and manager, are beginning the development of a group of seventeen claims in the Catalina mountains, about 3 miles south of Oracle. Their locations cover the strike of the ore bodies for about 2 miles, as shown by the surface croppings. Three shafts have been started, two of which are down about 90 feet. This work discloses copper sulphide ores running as high as 24% copper, with considerable amount of gold. Mr. Lake thinks the ores will average 10% copper. He contemplates putting up a concentrating plant if the showing continues as good as now appears.

Oracle, March 14. WASCOTT.

The Arizona Copper Hill M. Co. are developing a mine 5 miles southwest of Oracle and near Canyon del Oro. This company is made up largely of Denver men, J. D. Coplen being manager. The location covers an east-west vein in a granite formation. From the surface down to the present depth of shaft at 208 feet the ores are a green copper carbonate, rather low grade, but apparently of good width in the vein. The ideas of the company incline to the adoption of some leaching process, by which the ore may be treated at the mine. Besides a 208-foot shaft, the work includes 550 feet of drifting alongside the vein, about 100 feet of winze work and some crosscutting. A strong flow of water has been encountered and pumps may be required later. The hoisting is done by a gasoline engine.

Canyon del Oro, March 14.

It is reported in Tucson that Capt. J. D. Burgess has purchased for New York parties the Omega group and Penn millsite, at Helvetia, from L. Zeckendorf. This property is said to join the Isle Royal of the Helvetia M. Co., and has a considerable amount of development in sulphide ores.

Capt. Burgess reports that he has a six months' lease and bond on the Maudina and Guadaloupe groups, near Oracle, upon which he intends to erect a 10-stamp mill, with concentrators. The claims cover a ledge of ore which, in one place, is 60 feet wide, which shows good values in gold and lead by samples taken.

J. D. Moore and associates of Tucson are opening a property near Canyon Del Oro, known as the Bonanza, whereon they have a ledge of ore from the surface which runs high in silver and galena. It is proposed to thoroughly develop the property.

Oracle, March 16.

YAVAPAI COUNTY.

The Blue Bell mine is located in a low range of hills, about 6 miles southeast of Mayer. It embodies a group of three claims, which end-line with each other, covering over 3000 feet of a mineralized zone, which trends nearly north and south. Present development indicates that the ore-bearing zone is between 400 and 500 feet wide, standing at a dip of about 14° from the vertical, between a diorite footwall and a whin rock hangingwall. The material between the walls seems quite clearly separated into three strata, that next to the footwall being a chloritic slate, that next the hanging-wall a siliceous slate, with a diorite slate between. A peculiar thing observed is that the zone is crosscut at regular distances by narrow dikes of diorite, which stand almost vertically, cutting the formation at right angles. On that portion of the zone covered by this group there are five of these crosscutting dikes, from 500 to 900 feet apart. The ore found in streaks within the zone, and extending longitudinally with it, comprises a chalcopyrite, whose values, named in the order of their importance, are copper, gold and silver. The property is being developed through three different shafts, having a present depth of 300, 200 and 135 feet, respectively, besides which there are about 800 feet of work in drifts and crosscuts. To the depth of about 200 feet the ore would concentrate well, it is believed, but below that depth it becomes less suited to that method. The property belongs to Philadelphia parties, the management being in the hands of Ernest A. Haggott.

The extension of the branch of the S. F. P. & P. railroad from Prescott to Mayer, passing a short distance from McCabe, Chaparral and Big Bug, greatly facilitates the movement of machinery to the mines and mills of the districts named and the shipment of ore and concentrates to the smelters. Some further extensions are being considered, which take into account branches up Big Bug gulch, to Richinbar, on the Agua Fria, and to the Crowned King, in the Bradshaw mountains.

Mayer, March 10. WASCOTT.

The Octave mine and mill, belonging to the Octave G. M. Co., located southeast of Rich Hill, near the old village of Weaver, is mining and milling daily about 145 tons of ores that average approximately $11 per ton. Of this, from $2 to $3 per ton are saved in free gold on the plates, $2 per ton in concentrates, the balance of the saving being made from the tailings by cyanide work. All the mill tailings pass to a row of tanks where it is agitated by centrifugal pumps, allowed to settle, and then the sand is separated from the slimes by screw conveyors, the sand and slimes being subjected to cyanide in separate tanks, the slimes constituting about 10% to 15% of the tailing material. It is stated by mill superintendent J. McA. Johnston that the refuse after the leaching contains less than $1 per ton. Small engines operate the centrifugal pumps and conveyors and a motor operates a blower by which air is forced up through the cyanide tanks. The other features of the mill were well described by Mr. D. E. Bigelow, in an article which was published several months ago. The mine is being worked through two shafts, 625 and 585 feet depth, respectively, which are inclines on the dip of the vein, the latter having an east and west trend. The two shafts are connected by drifts on the 500-foot level. A third shaft sinks on an incline 250 feet on the same vein, at a point 500 feet from the other shafts. The vein matter, capable of being milled, has a width of from 20 inches to 9 feet. Oil burners are being placed under the boilers and storage tanks have been put up at the railroad station and the Octave Co. expects soon to use fuel oil to generate steam.

Octave, March 12.

The new Congress mill will soon be completed and ready to operate. It will consist of forty stamps, 1000-pounders, to drop 100 to the minute, and twenty concentrating tables. The anvil blocks, under the battery, weigh seven tons each, set in concrete and the latter upon stone blocks. The new engine room contains a new tandem, compound Corliss engine and a cross-compound compressor of twenty drills capacity. The three new boilers, aggregating 400 H. P., are fed by automatic stokers. The concentrator floor is 40x100 feet and well lighted. There are no amalgamating plates here, the process being one of concentration and cyanide work. The tailings from the tables are separated into two classes—the slimes and coarse material. The slimes are roasted before being cyanided, the coarse passing to the cyanide tanks direct. About 15% of the tailing product is thus roasted. The new mill will run about 150 tons per day, a twenty-mesh screen being used at the battery. The cyanide facilities will be enlarged so as to handle about 300 tons per day, as there is still a large accumulation of tailings on the dump.

The Congress ores range in value from $15 to $20 per ton, the concentrates from $150 to $200. The old mill, which is pretty well worn out, will be overhauled and repaired.

The mine workings aggregate about 15 miles, on two parallel veins and one cross vein, there being three incline shafts on the main vein and one on each of the others. The principal incline is 3300 feet in depth on the dip of the vein, having levels with much regularity at 75-foot stations. By systematic underground work good ventilation has been secured. The ores are a white quartz and iron pyrite, the values being chiefly gold.

Congress, March 17.

CALIFORNIA.

AMADOR COUNTY.

In a crosscut from the north drift at a point 225 feet north of the east crosscut from the North shaft to the main Mother Lode fissure in the Kennedy mine, on the 2300-foot level, rich ore has been found, indicating that, as in other localities, deep quartz mining pays in this county.

CALAVERAS COUNTY.

The Kinross ranch mining property, near Whisky Slide, is to be bonded to Chicago men.

At the Demarest mine, on the 600-foot level, a 6-foot ledge shows gold. The mill is in constant operation.

An electric pump is contemplated to handle the water in the Lucky Boy mine.

At Robinsons, the tunnel between the South Carolina and Melones tunnels is successfully completed; there is now a total length of 4152 feet. Electric cars will carry the ore to the 120-stamp mill now building. The tunnel will drain the entire group on the Carson side. An illustrated technical account of the work in this tunnel appeared in the issue of Nov. 5, 1898.

The Prince mine, in Altaville, is bonded and will be worked.

In the Tenderfoot mine, at Murphys, a

recent lot of crushed rock showed a yield of $1480 in free gold and $125 in sulphurets to the ton.

The Angels mine shaft is to be sunk 200 feet deeper.

EL DORADO COUNTY.

P. R. Stuart and five assistants on the American river, above Placerville, are doing preliminary work toward a cable transfer across the river to convey lumber across the river canyon from the north to the south side and to carry machinery and provisions for the camps in the reverse direction.

The Church Union mine, near Placerville, is unwatered to the 1200-foot level, leaving 50 feet to clear before operations begin.

The St. Clair mine, at Kelsey, will put in a pipe line and use water, instead of steam power.

Near Georgetown, F. C. Leavitt will resume work on the Demetre mine.

The Contraband, 2½ miles southeast of Georgetown, shows ore assaying $33.44 gold and six ounces silver per ton.

Near Grizzly Flats, at the Mt. Hope mine, W. R. Pearson is putting in 1800 feet of pipe line to convey power to a shaft on the north end.

FRESNO COUNTY.

The California Copper Syndicate, Ltd., has registered in London, capital £30,000 in £1 shares, to acquire copper and other mines, and in particular to acquire the mines known as McKinley, Last Chance, Heiskell, McKinley Extension and Heiskell Extension, in the county of Fresno.

KERN COUNTY.

The Union Trust Co. of New York has filed a $25,000 foreclosure suit against the Randsburg - Santa Fe Reduction Works, at Barstow. The plant has been idle for some time. It is locally believed that should the plant be sold at public auction the owners of the Yellow Aster mine at Randsburg will bid it in and have it removed there.

MARIPOSA COUNTY.

Captain Ward, owning the Pinon Bianco group, has organized a New York company, incorporated under the laws of New Jersey; capital, $2,000,000; work will begin next month.

At the Hite Cove mine is being treated 100 tons of tailings every twenty-four hours by the cyanide process. It is estimated that there are 40,000 tons, which may return $5 to the ton.

MONO COUNTY.

At the Standard Con. mill, in Bodie, for the week ending March 9, 412 tons of ore were crushed; average assay vanner tailings, $9.31; concentrates produced, 1.19 tons; assay value, $90.39; amalgam produced, 1527 ounces; assay value per ounce, $2.27.

NEVADA COUNTY.

A Grass Valley dispatch says the North Star ledge, in the central shaft, has been struck at a vertical depth of 1600 feet. In 1897 the North Star Mines Co. set aside an appropriation of $100,000 to sink the shaft and develop the central, which it was calculated would cut through the New York Hill and North Star veins and enable the company to develop the whole of that section for a radius of a mile or more. This appropriation proved inadequate, but the work was continued with successful determination.

Supt. Starr authoritatively denies the statement that miners' wages at the Empire, Grass Valley, were to be reduced to $2.50 per day. He will maintain the $3 rate.

The Red Cross mine, at Omega, is to be reopened.

PLACER COUNTY.

The tunnel at the Azalea mine, near Blue Canyon, is in 2900 feet.

The South Yuba Water Co.'s Auburn reservoir has been cleaned and lined with rock and cement. It is 120x120 feet wide and 12 feet deep, and will hold about 1,000,000 gallons of water.

SAN DIEGO COUNTY.

Last week the record for the number of desert oil claims filed with the County Recorder was broken, the total number for one day being 116 of 160 acres each, 18,560 acres, and on the following day the number of claims recorded was 118, comprising 18,880 acres of desert land.

SHASTA COUNTY.

The well of the Shasta Con. Oil Co., operating in Cow Creek district, 15 miles northeast of Redding, is down 300 feet; drill is now in blue shale; owing to the cutting off of the water supply from the flume of the Terry Lumber Co., the company is building a reservoir for the storage of its own water.——The Northern California Co-operative Oil Co., Ltd., capital $300,000, is incorporated at Redding to operate in Stillwater district.

The Mt. Shasta Co., Redding, is getting ready for active work and projects putting in a cyanide plant.

The statement is made that the Shasta King mine has developed a large body of sulphide ore, and that a 500-ton plant will be constructed this year.

TUOLUMNE COUNTY.

At Columbia, the Gray Eagle mine will resume April 1. Korbel Bros. will sink a new shaft 300 feet.

A 20-stamp mill is to be erected at the California Ophir mine, Carson Hill.

At Jacksonville, the Clio mine will resume April 1.

The Marshall G. M. Co. and the Grizzly M. & M. Co. have incorporated at Sonora.

The Mt. Jefferson mill is expected by Supt. Meighan to be in operation by April 1.

The water is lowered sufficiently in the Rawhide to permit partial resumption of work. At its present depth of 1900 feet, the Rawhide mine forms a basin into which the whole Rawhide flat is drained.

COLORADO.

BOULDER COUNTY.

The Colorado & Northwestern Railway Co. will construct a branch line from Sunset to Eldora.——The shaft on the Terror at Eldora is down 200 feet, and 325 feet of drifting is completed. The vein is 6 feet wide and the ore is said to run from $10 to $500, according to recent mill tests.——A strike of rich ore is reported made on the 95-foot level in the Concord, in Sugar Loaf district.——The shaft in the Superior at Ward is down 250 feet; J. P. Olympus, Supt.——The Revenge at Eldora is shipping 200 tons of ore per month. The shaft is down 300 feet and 500 feet of drifts are run at that depth; Three Strikes M. & M. Co., operators.

At Wall Street the Yellow Pine group of claims, adjoining the Logan mine, is being worked with three shifts of men by the lessees, Older & McClure.

CHAFFEE COUNTY.

At St. Elmo the big tunnel by which the Golf M. & M. Co. is to cut the Mary Murphy vein at great depth, has been started at the foot of the mountain, and will run several thousand feet before it reaches the vein, which it will intersect at a depth of about 2000 feet. The present workings are near the top of Murphy mountain.

CLEAR CREEK COUNTY.

Manager Sims of the Sun & Moon Co. has begun work in the Newhouse tunnel.

Near Georgetown the Hartford M. Co., succeeding the Empress M. Co., will resume work on the Empress tunnel, in addition to the development of the Gold Dirt and other claims.

GILPIN COUNTY.

L. H. Stockbridge is in charge of the Cook, Fisk & Gregory-Bobtail properties, Gregory district, recently operated by the Boston & Denver Con. M. & M. Co.

JEFFERSON COUNTY.

The pyritic smelter which the Clear Creek M. & R. Co. is building at Golden will have four furnaces and a daily capacity of 1500 tons.

LAKE COUNTY.

Six drill holes put down on the old Fryer hill bonanza have entered the sulphides 400 feet below the level of the top contact.

The Modoc at Leadville is making regular shipments of ore.——The Diamond G. M. Co., operating near Leadville, is putting in a new pumping plant and is sinking a new shaft; Supt. F. Brooks.——A station is cut and a new pumping plant is put in on the 500-foot level of the Valentine, near Leadville.——Sinking is resumed on the Butcher Boy group, in Ball Mountain district, and the shaft will be sunk to the 1000-foot level if necessary.

OURAY COUNTY.

Barbee & McMasters, at Ouray, will resume work upon the properties of the Ouray M. & M. Co.

SAGUACHE COUNTY.

Near Crestone the San Isabel M. & M. Co. has ore that runs 17% copper and some gold. The owners are preparing to put on a large force in both mine and mill.

Page & Pollock of Canyon City have a bond and lease on the Carbonate King group, in Dimick gulch, for $20,000, running one year. Their contract calls for 150 shifts per month.

SAN JUAN COUNTY.

The Henson Creek Lead M. Co. will start work on a dam and power plant to cost $20,000. J. O. Smith is agent at Lake City.

Near Silverton, in the Evening Star, Mastodon gulch, Supt. Yeckels has a strike in the lower crosscut tunnel run to cut the Evening Star vein.

SAN MIGUEL COUNTY.

The sale of the Contention group of mines, Telluride district, for $100,000 to the New England Exploration Co. is reported. The corporation is composed entirely of stockholders of the Calumet & Hecla Co., which is already the owner of the Smuggler-Union in San Miguel and the Sunnyside extension in San Juan county.

The litigation which has kept the Summit gold mines tied up for the past two years is finally terminated in favor of the Colorado G. M. & M. Co., a Milwaukee corporation, who in 1899 purchased the property from R. H. Wilson, trustee.

The Keystone Hydraulic M. Co. has recently organized at Telluride, E. L. Davis resident manager, and will put in extensive apparatus and machinery to work 652 acres placer ground 3 miles from Telluride.

TELLER COUNTY.

In the Florence, Victor, 300 feet of drifts north and south are run on the 333-foot level.——Sinking is resumed in the Raaler of the C. K. & M. Co., on Beacon hill, near Victor. The shaft, now down 225 feet, will be sunk to the 270-foot level, at which depth a crosscut will be run.——J. H. White and others, operating the Eclipse, near Victor, are making steady shipments of ore from the 100-foot level. A crosscut is being run on the 200-foot level.——The unwatering of the Clyde is nearing completion and sinking will probably be resumed.——A recent report of the secretary of the Doctor-Jack Pot Con. M. Co. shows net profits of the company for February were $89,000. Out of this a dividend of $29,000 was paid, leaving a balance in the treasury of $60,000.

The Anaconda G. M. Co. has transferred all its property to the Anaconda M. Co., the reorganized corporation, stamps indicating the consideration to have been $700,000.

In the Elkton the water in the shaft has receded 3 feet. Supt. Camp will put in two pumps of a capacity of 600 gallons each per minute. Stoping continues above the water level.

Near Victor the Morning Star, E. R. Argersinger manager, is developing ore in two veins on the 140-foot level.

The Mary Cashen shaft is to be sunk an additional 425 feet.

At Cripple Creek the King Gold has a 7-foot vein that goes $30 gold per ton.

IDAHO.

ADA COUNTY.

The property of the Owyhee Land & Irrigation Co. was sold under execution at Silver City last week for $50,000 to Potter, Phillips, McCrillis & Gray of Providence, R. I., and C. F. Stullaber of South Farnsworth, Mass.

BOISE COUNTY.

The War Eagle placers, at Idaho City, will be started next week. Assistant Manager Woodburn says they expect an excellent season. They recently received 60,000 pounds of metal riffles for use in their big operations. All the eight giants will be run.

C. H. Souther, president Boston & Idaho G. D. Co., says he will put two more dredgers at work along More's creek.

LATAH COUNTY.

Near Moscow the Pleiades Golden Gate will resume April 15. —— The White Cross, near the Golden Gate, will resume with a large force April 14. The company will put a 5-stamp mill on the property this spring.

SHOSHONE COUNTY.

At Wallace the Mammoth M. Co. has cut its vein in the lower tunnel, No. 6—the longest completed crosscut tunnel in the Cœur d'Alenes—3475 feet from the portal to the point of intersection of the vein. The Bunker Hill & Sullivan and the Empire State-Idaho companies have uncompleted tunnels that are now in farther, each of which will be about 2 miles long when completed.

WASHINGTON COUNTY.

The Sampson M. Co. is working the Irwin, Corie and Sampson mines, and has 7500 tons of ore blocked out which averages $20 gold per ton; Mr. Cudmore of Spokane, Wash., is manager.

The Utopia M. & M. Co., E. B. Hollingshead manager, has a diamond drill at work on a 60-foot ledge which has now been prospected to a depth of 280 feet; the ore averages $8 gold.

MONTANA.

CASCADE COUNTY.

On April 15th the entire works of the Great Falls silver smelter will close indefinitely.

DALY COUNTY.

The Butte & Boston and Boston & Montana Companies will discuss consolidation at a meeting in New York City April 2.

PARK COUNTY.

At Jardine, the Bear Gulch mine has produced over $300,000, the final payment of nearly $55,000 on the bond has been made out of profits twenty months ahead of time, the mine has over 9000 feet of development work and has a 20-stamp mill in constant operation. C. E. Elkin of St. Johns, N. B., one of the directors, has asked for a lease and bond on the mines for $1,100,000, which, if granted, will expire August 15, 1901.

The legal differences surrounding one of the principal mines in Bear gulch are at an end and plans perfected which will lead to the immediate resumption of work on the Bush properties.

SILVER BOW COUNTY.

All employers of labor in Butte have received notification from the Butte Workingmen's Union that, beginning with May 1, 1901, the hours of labor in Butte for common or unskilled labor shall be eight hours only, the pay still to be the same or not less than $3 per day.

The Farrell Copper Co. has bought 200 acres on the Meaderville flat for a figure close to a million dollars. F. Farrell is at the head of the enterprise. D. Gillies is superintendent, and has started a double-compartment shaft from the surface.

NEVADA.

ELKO COUNTY.

Near Wells, a California company, represented by G. C. Willis, has made extensive locations and will bore for oil. Surveyors from all portions of eastern Nevada are surveying locations.

HUMBOLDT COUNTY.

A deed for mining property has been filed in Winnemucca covering a number of claims in Granite Creek district, near Golconda. The Granite Creek S. & R. Co. is the purchaser; consideration, $1,999,993; A. W. King, secretary. The deed bears two $1000 revenue stamps.

NYE COUNTY.

The Nevada Co. has men at work on the Berlin mines, near Ione; a 25-stamp mill, lighted by electricity, is running.

STOREY COUNTY.

The Enterprise says that from a graphite mine discovered on the Ophir grade the owners are shipping to Sacramento and getting $1500 per ton for the plumbago on board the cars at Washoe City.

WASHOE COUNTY.

At Steamboat Springs, a shaft is being sunk by J. H. Hopkins. Claims have been located for several miles east and west of the springs.

At Olinghouse, the Slip mill is running on gravel, reducing thirty tons per day.

WHITE PINE COUNTY.

A new combination 150-ton mill will be put in at the Chainman, Ely. A final payment of $50,000 on the property was recently made.

NEW MEXICO.

BERNALILLO COUNTY.

Reports from Bland are to the effect that the Cochiti mine produced $26,000 gold and made about $6800 net in February. In January the net profit was about $3000.

COLFAX COUNTY.

At Elizabethtown, the Black Cooper mill of the Taos G. M. Co. is to have additional stamps.

Men are at work on the Reiling dredger; the machinery will weigh 300,000 pounds.

The Baldy tunnel, headed for the heart of Baldy mountain—3000 feet in—is in 240 feet.

OREGON.

BAKER COUNTY.

The new boiler for the Bonanza mine is the heaviest piece of machinery that has ever arrived in the camp. It weighs 29,470 pounds.——The California mine has ordered a complete compressor plant and three drills.——The Liberty Bell mine has ordered a machine drill.——The Bald Mountain mine is installing a new light plant.——The new compressor plant for the Golconda mine has arrived and is being set up.——Butte, Mont., and Tacoma, Wash., parties have recently purchased the Sunrise mine. It adjoins the Inter-Mountain on the west.——The machinery for the Quebec's new mill has arrived.

Sumpter, March 16.

Letson Balliet says he now has final and undisputed possession of the White Swan mine at Baker City.

A 16,000-foot aerial wire ropeway now connects the North Pole mine with its mill on Silver creek; capacity 240 tons per day, estimated cost 12 cents per ton.

The 20-stamp mill of the Bald Mountain G. M. Co., Bald Mountain mine, Mammoth district, between Sumpter and Granite, is working to the satisfaction of Manager McCallum.

The smelter has resumed at Mineral City, 22 miles south of Huntington.

P. J. Cirkle, general superintendent J. E. Searles' Western mining interests, has issued an order closing down the Cornucopia mine until the arrival of the newly appointed receiver, Geo. D. Beattys.

The Sumpter smelter is reported sold to

J. F. Bachelder and Z. Houser of Portland.

UTAH.

JUAB COUNTY.

Mr. Earl, former Superintendent Mammoth, has an option on the Bertha group, West Tintic, in which he agrees to pay $20,000 before thirty days. Picked samples from the new strike show 6000 ounces silver, 50% lead. The Bertha lies between the Orient and the Scotia, with the collar of its shaft 600 feet east of that on the former.

SALT LAKE COUNTY.

The Columbia M. Co., at Bingham, invite bids for their new smelting plant; F. B. Cook, manager.

At the Highland Boy, Superintendent White is putting through an average of 500 tons of ore daily, from which is derived about 40,000 pounds of bullion.

SUMMIT COUNTY.

At the Quincy mine, at Park City, D. C. McLaughlin has an ore body on the 300-oot level of which much is expected.

WASHINGTON.

FERRY COUNTY.

Jay Graves, general manager Granby, B. C., smelter, says he will build a railroad to Republic if the mine owners there will send their ores to his smelter. He offers a freight and treatment rate of $7 per ton and to pay 95% of the value of the metals in the ores.

STEVENS COUNTY.

Supt. Morris will install drills, hoists and other machinery in the Gold Bug, near Colville.

FOREIGN.

BRITISH COLUMBIA.

Kaslo is asked to give a cash bonus of $50,000 and exemption from taxation to a proposed smelter.

Shipments of fluxing ore from the Iron King property, near Slocan Junction, to the Hall Mines smelter, Nelson, have been discontinued. Considerable copper has been coming in the ore, which destroyed its value as a flux.

At Ymir, the Wilcox, Foghorn and Second Relief will put in stamp mills; the Arlington will put in a fifty-ton concentrating plant. A tramway will be built from the mine to the mill, 2000 feet.

Commercial Paragraphs.

THE Justinian Caire Co. is removing its entire business from 521 Market street to the company's handsome new building just finished at 567-569 Market street, San Francisco.

THE Sullivan Machinery Co., Chicago, manufacturers of mining machinery, has purchased the business and plant of the M. C. Bullock Manufacturing Co., of the same city, taking possession on the 1st inst.

THE Broderick & Bascom Rope Co., of St. Louis, Mo., are sending to their customers a neat little advertising novelty in the shape of a celluloid stamp case with calendar and price list of their patent steel rope on the back. This should prove good advertising for this concern.

KEUFFEL & ESSER CO., of New York City, have established a branch house at No. 303 Montgomery St., San Francisco, which will carry a complete stock of their well-known drawing materials and survey instruments. The San Francisco branch will be represented by Jno. R. Carr and W. E. Holcomb.

THE American School of Correspondence, Boston, Mass., has among its instructors men who are regular teachers in several of the technical schools of Boston, with unusual advantages for teaching the theory of trades and engineering professions. Their free scholarship for engineering and mechanical drawing is a feature which attracts attention. Without leaving home or losing time from his regular work, the student pursues a course of study under the direction of instructors, papers guiding him in his work being prepared and delivered to him. Besides this, special information concerning any difficulties which may arise in their course is furnished the students.

THE Gates Iron Works, Chicago, have sold a complete copper smelting and converting plant to the Granby Mining & Smelting Co. of Grand Forks, British Columbia, this being a second order from the same concern. This order completes one of the largest copper smelting and refining plants built in the United States or Canada. The second order consists, in part, of two more water jacketed furnaces, 44″x160″; a complete ore crushing and sampling works, with No. 5 style "D" crusher, one 9″x15″ Blake crusher, one "F" Gates crusher, one sample grinder, three sets of rolls, elevators, etc.; complete silica crushing mill, including a Dodge crusher, dry pans, rolls, elevators, etc.; one tilting reverberatory furnace complete, one converter stand complete, cars, a complete hydraulic system, blowing engine; one 10-ton electric crane and one 40-ton electric crane.

Personal.

CLARENCE KING is at Palm Beach, Florida.

JNO. FILLIUS of Redding, Cal., has gone to Boston.

A. DEL MAR is examining mining property at Randsburg, Cal.

W. J. CLARK, foreign manager General Electric Co., is in London.

EDGAR RICKARD is examining mining property at Pony, Montana.

R. B. HANLEY has been appointed receiver Sybil mine, Shasta county, Cal.

PERCY WILLIAMS succeeds P. H. Lynch as Supt. Century mill, Park City, Utah.

JNO. MITCHELL has been re-elected president United Mine Workers' Union.

W. G. DOUGLASS succeeds C. Belknap as Supt. Justice mine, Virginia, Nevada.

W. L. CLARK is now Supt. the Lowell & Arizona copper mines, Bisbee, Arizona.

W. J. CHALMERS of Fraser & Chalmers, Chicago, was in San Francisco this week.

M. R. QUEEN succeeds F. Morehouse as Supt. Utah Queen mine, Dry Canyon, Utah.

E. L. BALLOU of Shasta, Cal., takes charge of mine and mill work at Pony, Montana.

H. T. VAN F. FURMAN now fills the chair of metallurgist at the Golden, Colo., School of Mines.

THOS. M. BUZZO, manager Alice mine, has returned from San Francisco to Walkerville, Montana.

N. L. AMSTER is to be the consulting engineer of the Arizona Commercial Co. at Globe, Arizona.

F. SCHMEDER succeeds H. Ward as foreman Ralston Divide G. M. Co.'s mines, Long Canyon, Cal.

R. H. NORTON of the Oakland, Cal., Iron Works has returned from a business visit to Seattle, Wash.

V. S. GARBARINI of Amador county, Cal., goes as superintendent of a mine 30 miles from Juneau, Alaska.

ROBERT BELL has been appointed chief of the Canadian Geological Department to succeed the late Dr. Dawson.

KLONDIKE COMMISSIONER OGILVIE writes that as soon as his resignation is accepted he will visit California.

E. C. VOORHEES, Pres. California State Miners' Association, has returned from San Francisco to Sutter Creek, Cal.

F. A. C. PERRINE, formerly of Stanford, Cal., has been re-elected president Stanley Electric Co., Trenton, N. J.

W. B. MILLIKEN retires from the management of the Union Gold Extraction Co.'s mill at Florence, Colo., April 1.

CHAS. H. KRAUSE has resigned the superintendency of the Tamarack, Mich., mine to take charge of the Mass mine.

IRA FRANCIS succeeds W. J. Barrett as representative of the interests of the John A. Roebling Sons' Co. at Los Angeles, Cal.

E. O. WOLCOTT, a Colorado miner, is to be Secretary of the Interior—a fact of favorable interest to miners everywhere.

M. L. LOWREY, former foreman Angels Iron Works, Angels, Cal., is now with the Daniel Best Mfg. Co., San Leandro, Cal.

ABBOT A. HANKS has returned to San Francisco from New York, visiting several mining districts in Colorado and Utah on the way.

H. A. KELLER has returned from Australia and Chile, and is now general manager Trinity Copper Co., with headquarters at Redding, Cal.

T. H. OXNAM, M. E., has been appointed general manager Palmarejo & Mexican Gold Fields, Ltd., Zapote, Chinipas, Chihuahua, Mexico.

W. C. RALSTON, prominent in mining and financial legislation in the recent session of the California Legislature, has resumed active charge of his mining enterprises in Calaveras county, Cal.

THE vacant principalship of the Wilmerding Trades School, San Francisco, has been filled by the appointment of George A. Merrill, principal of the California School of Mechanical Arts. Mr. Merrill will be at the head of both schools.

REGARDING the Berliner telephone decision, Jno. I. Sabin frankly says: "I agree to have 30,000 subscribers in San Francisco at the end of this year and 40,000 at the end of next year; and further guarantee to destroy every dollar any opposition man wants to put into this field, and this without reducing a single rate by reason of opposition. This business is an absolute monopoly. It remains to be seen whether the people want us or the other fellow."

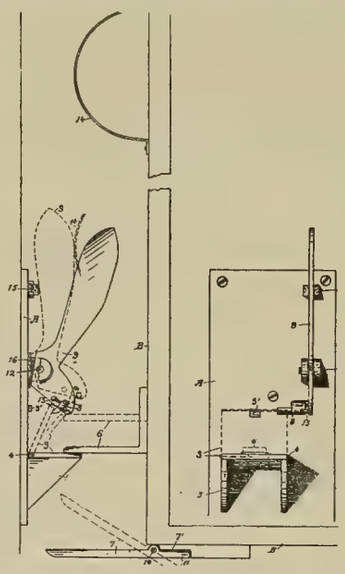
Recently Declared Mining Dividends.

	Payable.
Mammoth M. Co., Utah, 5 cents per share, $20,000	March 18
Isabella G. M. Co., Colo., regular quarterly dividend, 1 cent per share, $22,500	March 18
Home M. Co., Leadville, Colo., 25 cents per share, $12,500	March 20
Napa Con. Quicksilver M. Co., Cal., quarterly dividend, 10 cents per share	April 1
New Idria Quicksilver M. Co., Cal., quarterly dividend, 10 cents, and 10 cents extra	April 1
Modoc M. & M. Co., Pueblo, Colo., 1 cent per share, $5000	March 16
Gold Coin M. Co., Colo., $30,000	March 25
Con. Mines Co., Colo., $10,000	March 25
Bull Hill Con. M. Co., Colo., $7500	March 25
Homestake M. Co., South Dakota, regular monthly dividend, No. 309, 25 cents, extra dividend, No. 310, 25 cents per share	March 25
Gwin M. Co., California, $15,000; total, $191,500	March 25
Utah M. Co., Utah, 2 cents per share, $2000	March 25

Notices of Recent Patents.

Among the patents recently obtained through Dewey, Strong & Co.'s SCIENTIFIC PRESS U. S. and Foreign Patent Agency, the following are worthy of special mention:

AUTOMATIC DUMB WAITER STOP.—No. 669,266. March 5, 1901. C. W. Pierce and A. McMahon, S. F. This invention consists of a hinged rest upon the wall of the elevator well, a projection



from the cage adapted to engage the rest or stop and means carried by the cage to elevate it out of the path of movement of the cage and to hold it elevated during the desired period. There are also means for releasing the rest or stop to allow it to drop into its normal position.

HAME HOOK.—No. 669,699. March 12, 1901. Don Jackson, Pleasant Grove, Cal. This invention consists of a two-part hook having one end bent to engage the staple or fastening by which it is connected with the hame and the other with a slot and opening at one side by which the connecting link of the chain is introduced, the two turnable about the pivot pin so as to interlock and retain the chain in place and form a solid lock and brace when closed.

Trade Treatises.

Electric Locomotives for Mine Haulage, in green and silver, issued in the usual sumptuous style of the Westinghouse Electric & Mfg. Co., Pittsburg; replete with such practical information as would naturally be desired by a miner on that subject.

Bulletin No. 1004, from the Denver Engineering Works Co., Denver, Colo., describing the improved Cammett concentrator, illustrated by half-tone engravings, showing the concentrator in its various parts, and giving a clear idea of its construction. Complete dimensioned drawings of both table and counter shaft are also given, together with general data, so that any one designing a mill, and desiring to show a Cammett table in the plans, can find all necessary information. The most noticeable improvements which have been made recently on the concentrator are the simple and efficient head motion and the pulp distributing box. The bulletin includes working drawings of classifier, with the dimensions of various sizes conveniently tabulated. It also includes a classified list of the more important minerals, together with their specific gravities, which will be found a useful reference for men engaged in ore concentration. This bulletin will be forwarded on application to the Denver Engineering Works Co., 30th and Blake Sts., Denver, Colo.

Publications Received.

"Metal Statistics" is the title of an unusually elaborate and concise series of tables containing prices, stocks, production and supply of copper, tin, lead, spelter, aluminum and iron, embracing a period of nearly fifty years, arranged in a simple but comprehensive form. It contains twelve pages, large folio size, paper cover, and is issued by the Report Company, 61 Beekman street, New York City; price $1 per copy.

List of U. S. Patents for Pacific Coast Inventors.

REPORTED BY DEWEY, STRONG & CO., PIONEER PATENT SOLICITORS FOR PACIFIC COAST.

FOR WEEK ENDING MARCH 12, 1901.

669,497.—STOOL — Augusta Adler, Tacoma, Wash.
669,911.—AMALGAMATOR—G. S. Bartholomew, Los Angeles, Cal.
669,914.—MOP WRINGER — C. S. Darby, Salem, Or.
669,937.—FELLY ADJUSTER—W. W. Endicott, Myrtlepoint, Or.
669,996.—SAW—C. C. Henry, S. F.
669,6 9.—HAME HOOK — D. Jackson, Pleasant Grove, Cal.
669,796.—STOVE—S. W. Jackson, Selma, Cal.
669,835.—BOOT CALK—J. R. Johnston, Eureka, Cal.
669,751.—TRANSPORTING FISH — H. B. Joyce, Seattle, Wash.
669,645.—VELOCIPEDE—F. A. Kelley, Susanville, Cal.
669,944.—TELEPHONE—Merritt & Hays, S. F.
669,589.—PUMP—C. L. Parker, Los Angeles, Cal.
669,590.—PUMP—C. L. Parker, Los Angeles, Cal.
669,852.—CURRENT WHEEL — E. Peterson, Spokane, Wash.
669,553.—LOOMS—D. M. Seaton, S. F.
669,736.—BIN CABINET — Q. R. Smith, Santa Ana, Cal.
669,601.—THRUST BEARING — F. P. Smith, Los Angeles, Cal.
669,811.—CALENDAR—A. A. Sparks, S. F.
669,558.—STEAM GENERATOR — E. E. Stoddard, S. F.

Latest Market Reports.

SAN FRANCISCO, March 21, 1901.

SILVER—Per oz., Troy: London, 28 1/16d (standard ounce, 925 fine); New York, bar silver, 60⅞c (1000 fine); San Francisco, 60⅞c; Mexican dollars, 50c San Francisco, 49c New York.

COPPER.—New York: Lake, 1 to 3 casks, $17.25; carload lots, $17.00; Electrolytic, 1 to 3 casks, $16.75; carload lots, $16.50; Casting, 1 to 3 casks, $16.65; carload lots, 16.50. San Francisco: 18. Mill copper plates, 20c; bars, 22@23c. London: £69 per ton, equivalent to a net price of 14.9c per pound, the lowest since January, 1900, when copper was selling in London at £69 2s 6d and in New York Lake was selling at 16 cents per pound. Since January 1 London value of G. M. B. copper has fallen £5 10s per ton, or about $1.10 per 100 pounds. In the domestic market prices have not varied over ⅛ cent. The London decline is not due to pressure to sell or to bear attacks, but to absence of demand and lack of support from American buyers, who had held the market at a fixed level.

LEAD.—New York, $4.37½; Salt Lake City, $4.00; St. Louis, $4.20; San Francisco $5.00, carload lots; 5½c 1000 to 4000 lbs.; pipe 6¾, sheet 7½, bar 6c; pig, $4.70 @5.10. London, £13 2s 6d per ton=2.85 cents per ℔.

SPELTER. — New York, $4.00; St. Louis, $3.50; London, £17 per ton=3.7 cts. per ℔; San Francisco, ton lots, 5¼c; 100-lb lots, 6c.

ANTIMONY.—New York, Cookson's, 10c; Hallett's, 9⅝c; San Francisco, 1000-lb lots, 12c; 300 to 500 lbs., 13@14c; 100-lb lots, 15@18c.

IRON.—Pittsburg, Bessemer pig, $15.00;

gray forge, $14.25; San Francisco, bar, per lb., 2.65c in small quantities.

STEEL.—Bessemer billets, Pittsburg, $21.75; open hearth billets, $25.00; San Francisco, bar, 7c to 12c per lb.

TIN.—New York, pig, $26.50; San Francisco, ton lots, 29c; 1000 lbs., 29½c; 500 lbs., 29¾c; less, 30c; bar tin, ₱ lb, 35c.

QUICKSILVER.—New York, $51.00 large lots; London, £9 2s 6d; San Francisco, local, $47.50 ₱ flask of 76½ lbs.; Export, $45 00

MAGNESIUM.—New York, $2.90 ₱ lb.; San Francisco, $3.75.

ZINC.—San Francisco, 5½c; slab, 5¾c; bar, 7c; zinc dust, N. Y., 8c.

BABBITT METAL.—San Francisco, No. 1, 10c.

SOLDER.—Half-and-half, 100-lb. lots, 18½c; San Francisco, Plumbers', 100-lb. lots, 15½c.

ASSAY LITHARGE.—San Francisco, 10c ₱ lb, small lots.

BISMUTH.—New York, ₱ lb., $2.25 50-lb lots; San Francisco, $2.50 to $2.75 lb lots.

PLATINUM.—San Francisco, crude, $17 ₱ oz.; New York, $18.20 per Troy oz

ALUMINUM.—New York, No. 1, 99% pure ingots, 35c; No. 2, 90%, 30c to 35c.

FERRO-MANGANESE.—Pittsburg, 80%, domestic, $62.50, large lots.

TUNGSTEN.—New York, ₱ lb., 95c; San Francisco, $1.15.

FERRO-TUNGSTEN.—New York, 37%, 32c; San Francisco, 65c (60%).

NICKEL.—New York, 50@60c ₱ lb.

PHOSPHORUS.—F. o. b. New York 50@60c ₱ lb.

POWDER.—F. o. b. San Francisco: No. 1. 70% nitro-glycerine, per lb., in carload lots, 15½c; less than one ton, 17½c. No. 1*, 60%, carload lots, 13½c; less than one ton, 15½c. No. 1** 50%, carload lots, 11½c; less than one ton, 13½c. No. 2, 40%, carload lots, 10c; less than one ton, 12c. No. 2* 35%, carload lots, 9½c; less than one ton, 11½c. No. 2** 30% carload lots, 9c; less than one ton, 11c. Black blasting powder in carload lots, minimum car 728 kegs, $1.50 per keg; less car lots, $2 per keg.

CAPS.—3x, $5.50 per 1000; 4x, $6.50; 5x, $8; Lion, $9, in lots not less than 1000.

FUSE.—Triple tape, $3.60 per 1000 feet; double tape, $3.00; single tape, $2.65; Hemp, $2.10; Cement No. 2, $3.00; Cement No. 1, $2.65, in lots of 3000 feet and up.

CANDLES.—Granite 6s, 16 oz., 40s., 11½c ₱ set; 14 oz., 40s., 10c.

CHEMICALS.—Cyanide of potassium, 98%-99%, jobbing, 32½@33½c ₱ lb.; carloads, 30@31c; in 10-lb. tins, 40c; sulphuric acid, in carboys, 66% B, 2c ₱ lb.; soda ash, $1.90 ₱ 100 lbs. 58%; hyposulphite of soda, 2½@3c ₱ lb.; blue vitriol, 5½@6½c ₱ lb.; borax, concentrated, 7@8c ₱ lb.; chlorate of potash, 12@13c; roll sulphur, 6c; alum, $1.90@2.00; flour sulphur, French, 2½@2½c; California refined, 1¾@2c; nitric acid, in carboys, 8c ₱ lb.; caustic soda, in drums, 3@4c ₱ lb.; Cal. s. soda, bbls., $1.00; sks, 95c ₱ 100 lbs.; chloride of lime, spot, $2.50@2.60; nitrate of potash, in kegs, 8c: caustic potash, 10c in 40-lb. tins.

WANTED.

WANTED.—A COMPETENT MAN TO TAKE charge of a 40-ton copper smelting furnace in Arizona, with a company that affords opportunity for advancement Address, stating experience had and salary required, ELIOT, this office.

Wanted—Rand Drill Man.

Must be capable of running compressor. State experience and wages required. One acquainted with Mexico and language preferred. Address DRILL, care of Mining and Scientific Press.

WANTED—Belt Driven Air Compressor.

Address, giving particulars, B. A. C., this office.

WANTED.

A THOROUGH, UP-TO-DATE ASSAYER—A technical graduate, competent to keep mine books, not over 25 years of age, good health, not afraid of work, must write a good hand, be accurate at figures, good habits, must furnish A1 references. Pay, $2.50 per day; board, $20.00 per month. One of pleasantest situated mines in California. Chance for advancement to assistant manager to the right man. Address Box 27, care this paper.

BRITISH COLUMBIA MINES.

Gold, Silver-Lead and Copper Properties. Excellent chance for profitable investments in legitimate mining in BRITISH COLUMBIA. Capital needed for developing promising prospects. A specialty made of FREE MILLING GOLD properties. Very promising FREE MILLING GOLD properties for sale; terms reasonable. Mines examined and reported on by reliable mining engineers. Correspondence solicited Address Andrew F. Rosenberger, P. O. Box 700, Nelson, B. C.

SITUATIONS WANTED.

A practical, experienced Cyanider, Assayer and Chemist, familiar with general mill work, desires a position. References furnished. Address Cyanider, care this office.

A Mining Engineer with many years' experience as manager of large properties in the United states and Mexico, is open to an engagement as manager or superintendent. Possesses both executive and managerial ability and can furnish the best of testimonials Address Box 29, care of this office.

TO GOLD DREDGING COMPANIES.

A mining and electrical engineer, with six years' experience at successful gold dredging, is desirous of obtaining a position as superintendent with a dredging company. Can design machinery to suit any conditions. Address "Gold Dredge," this office.

ABOUT May 10, a young man wishes position as assayer or assistant assayer and surveyor; has had practical experience, including cyanide work, with college training; wider experience desired; moderate pay with chance for advancement; references. Address "Gabbro," this office.

Expert Cyanider and Matte Smelter, experienced in quartz mining, milling, chlorination (O K chemist and assayer), wants to take charge of or design plant, develop or report on (incl. survey) property. Would accept temporarily subordinate position as shift, mill, or furnace boss, or in laboratory, till advanced. A1 references. "Practical," this office.

WANTED.—A POSITION AS AN ASSAYER and General Assistant, if desired. Ten years' experience in general mining. Two years managing mines in Mexico. Practical knowledge of language. Address Box 28, care of this paper.

Situation Wanted by Mining Engineer of 20 years' experience in California, Colorado, Mexico and Germany. Has had charge of large properties—gold, silver, lead, copper, sulphur and oil. College graduate; good assayer, surveyor and accountant; speaks Spanish. Has experience in railroad construction and road building. Formerly U. S. deputy mineral surveyor and member of geological field force. Will go anywhere. Address P. M., Mining and Scientific Press.

Position as Superintendent

of a gold mine or mill desired by an experienced mining engineer and metallurgist. Competent to take full charge of a gold mine or mill. Technical graduate. Good assayer, surveyor, etc. Can leave present position on short notice. Salary moderate. Address "B. Sc.," care of this paper.

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An oil filter that saves half your oil bills, an oil filter that filters and filters right.

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Shall we send one on approval, to be returned at our expense if not satisfactory?

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Largest Mfrs. of Oil Filters in the World.

We also manufacture the BURT EXHAUST HEAD.

Annual Meeting.

The Regular Annual Meeting of the Stockholders of the CHAMPION MINING CO. will be held at the office of the Company, 113-114 Crocker Building, San Francisco, California, on TUESDAY, the 9th day of April, 1901, at the hour of 2 o'clock P. M., for the purpose of electing a Board of Directors to serve for the ensuing year, and the transaction of such other business as may come before the Meeting.

Transfer Books will close on SATURDAY, March 30, 1901, at 12 o'clock noon.

B. N. SHOBCRAFT, Secretary.

Office—113-114 Crocker Building, San Francisco, California.

WE BUY very rich Ores, Dental Scraps, Tellurium Ores, Mill Wastes, Jewelers' Sweeps, Gold Retorts, Old Iron Retorts, Base Amalgam, Quicksilver, Amalgamated Plates, Gold and Silver, Old Slags.

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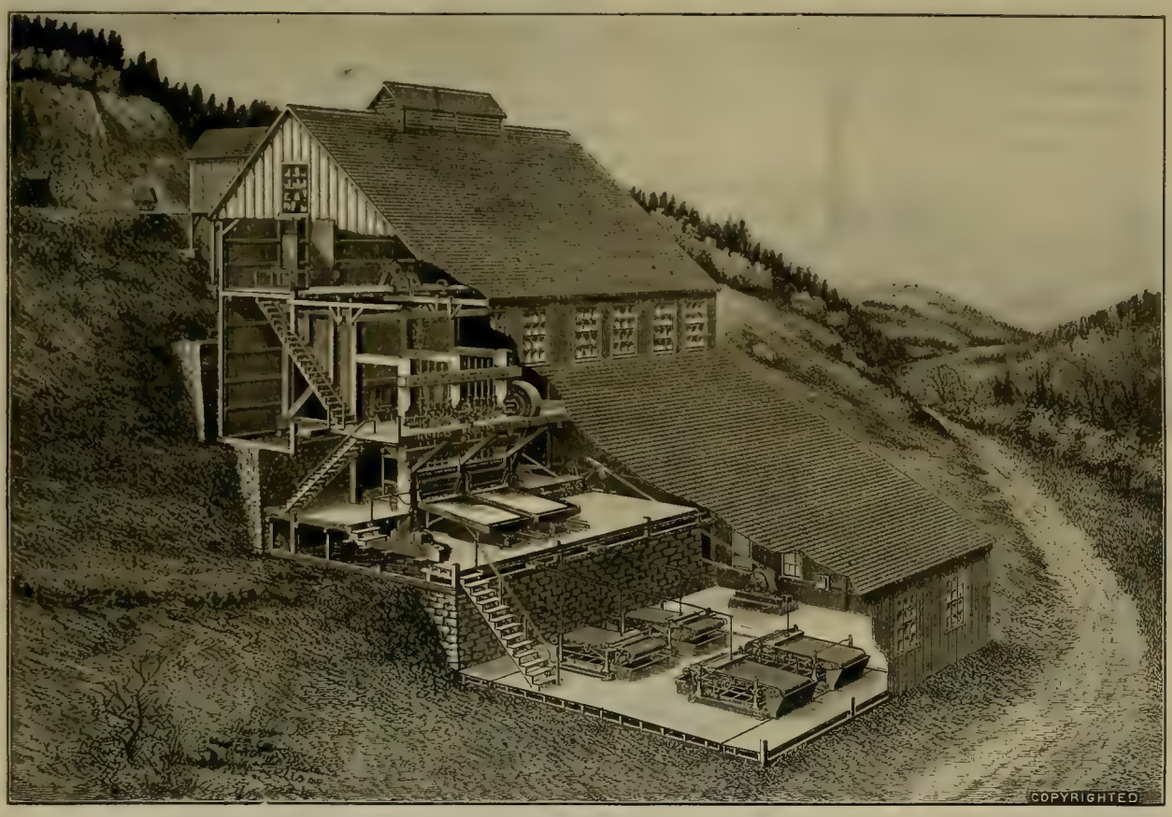

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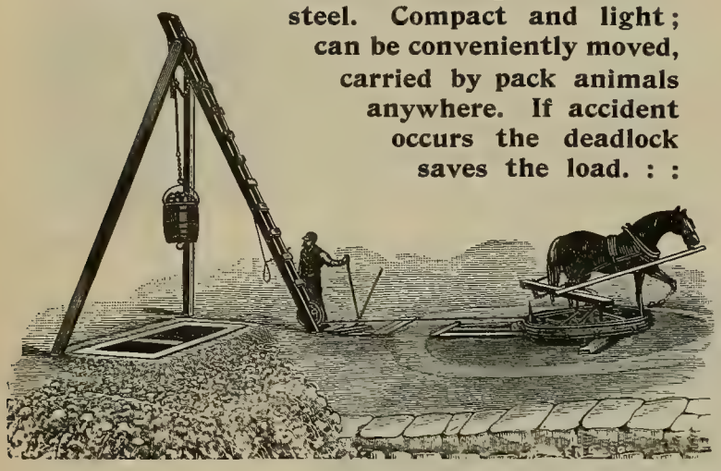

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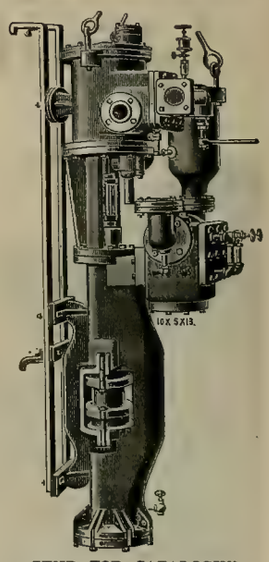

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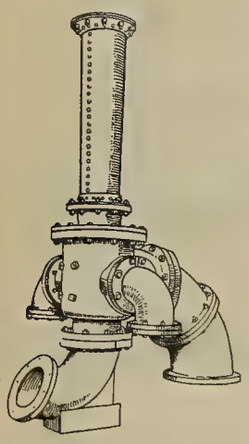

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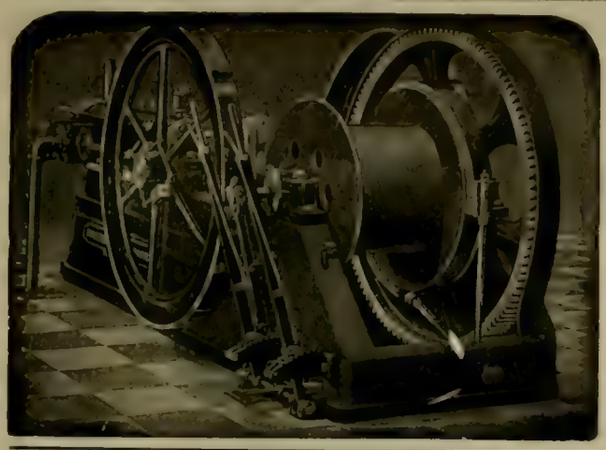

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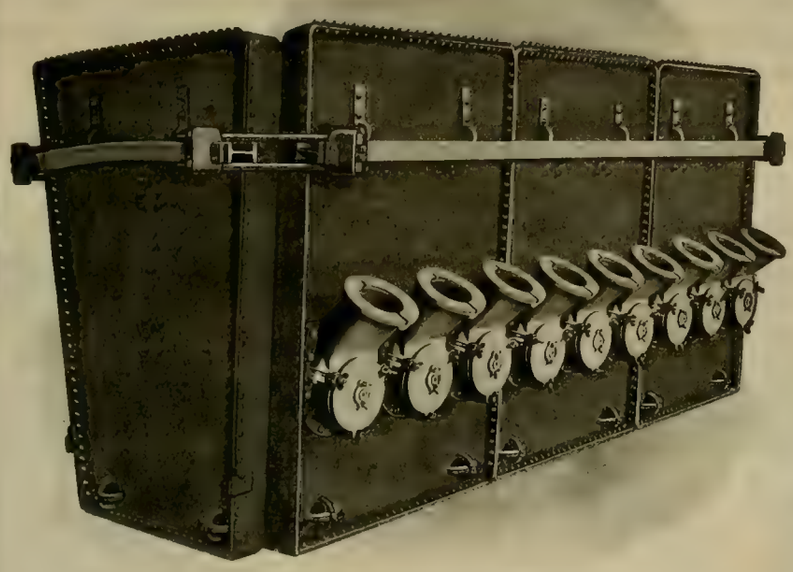

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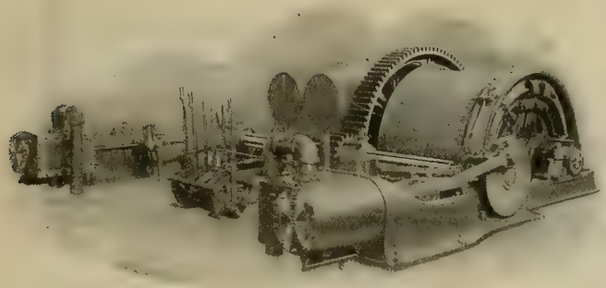

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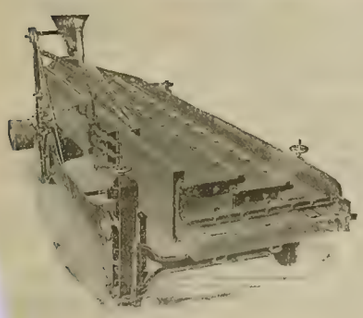

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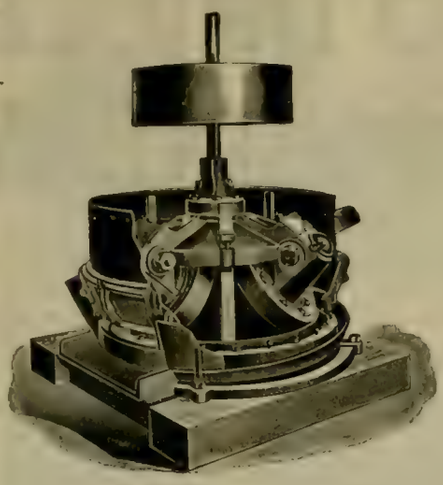

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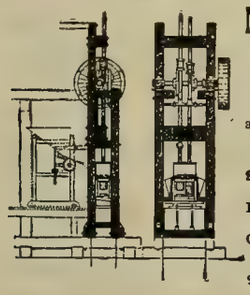

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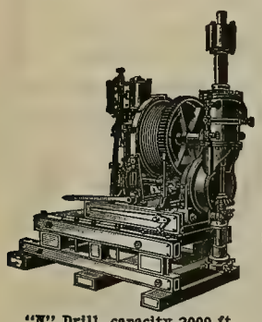

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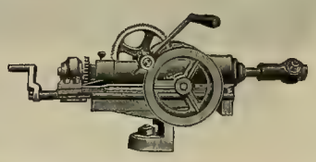

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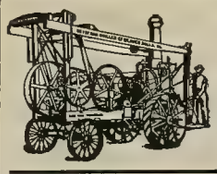

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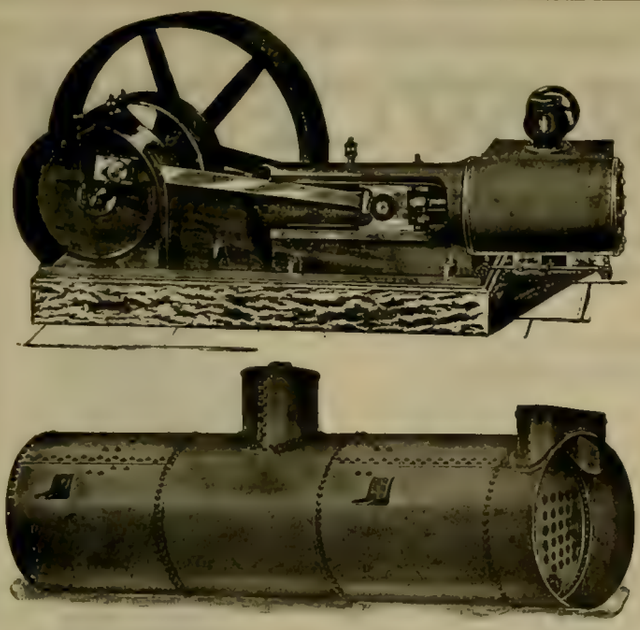

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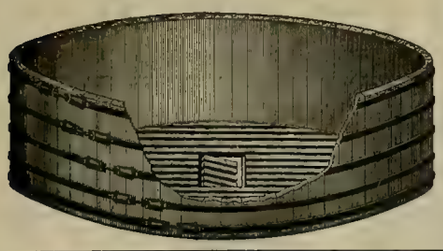

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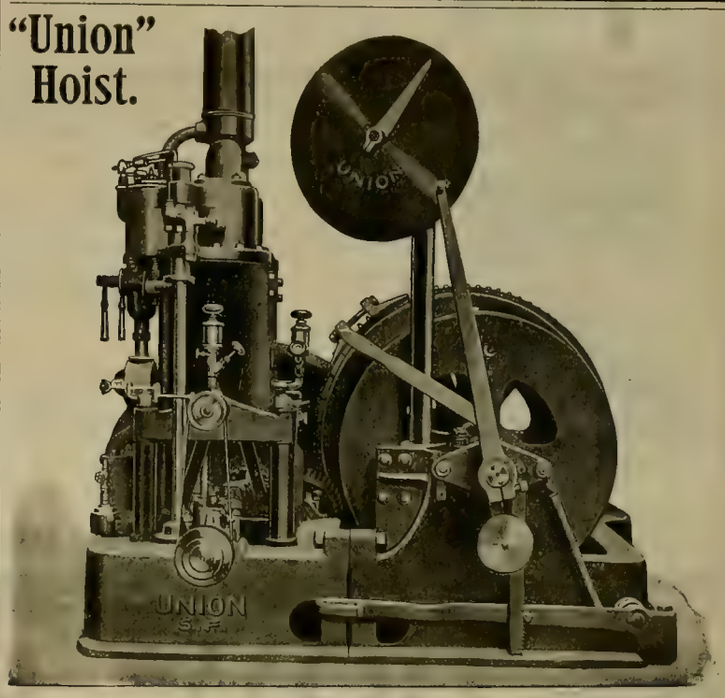

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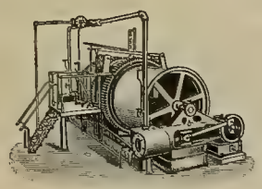

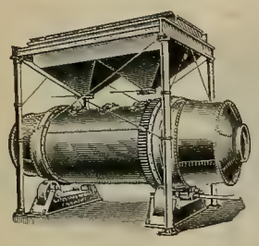

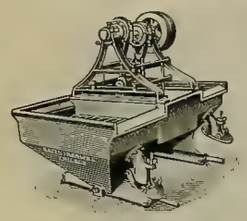

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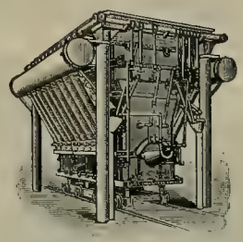

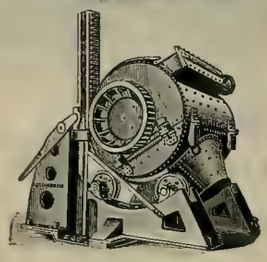

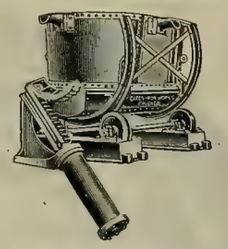

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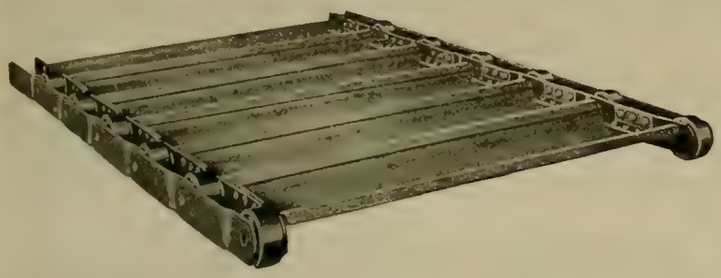

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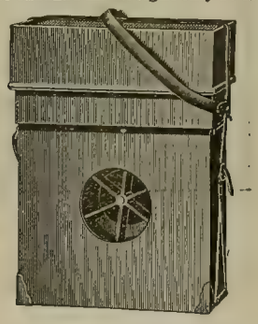

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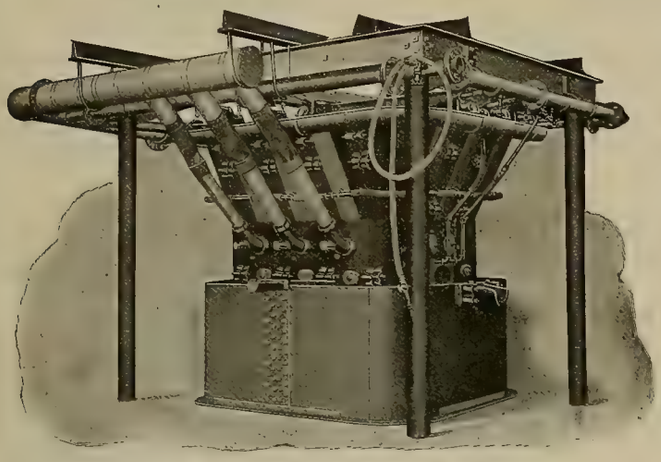

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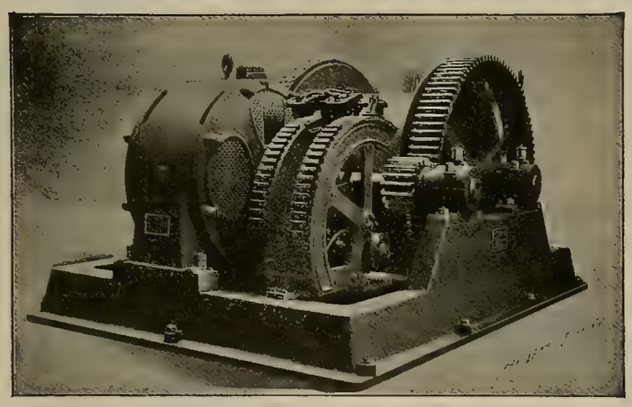

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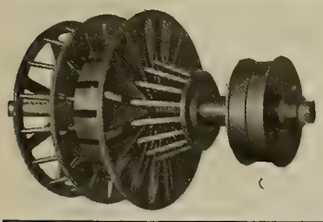

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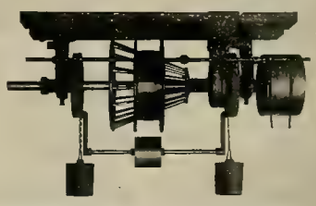

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WILL DO IT FOR YOU.

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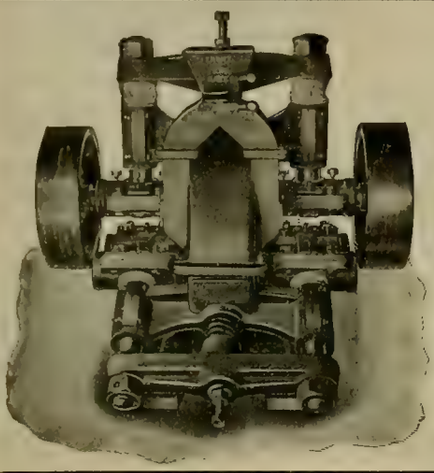

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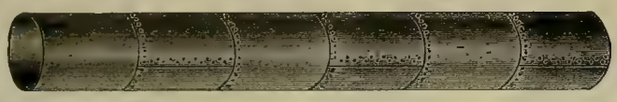

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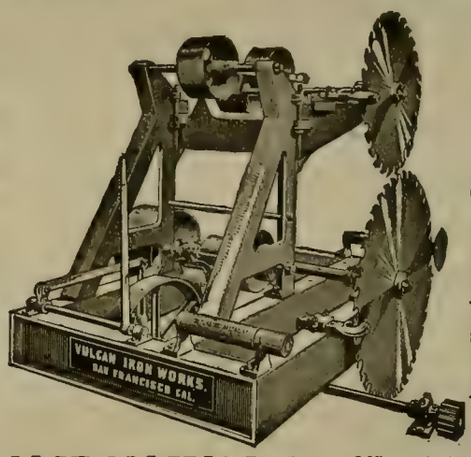

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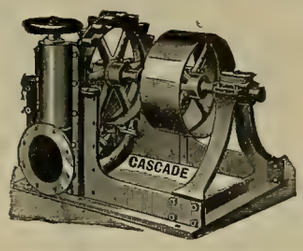

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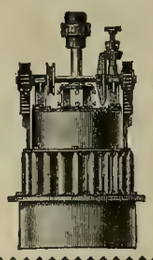

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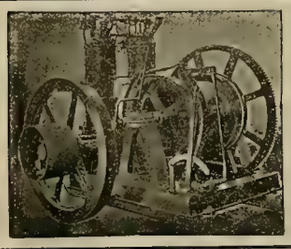

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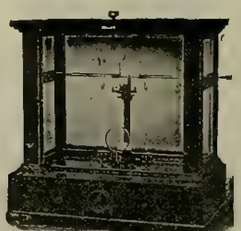

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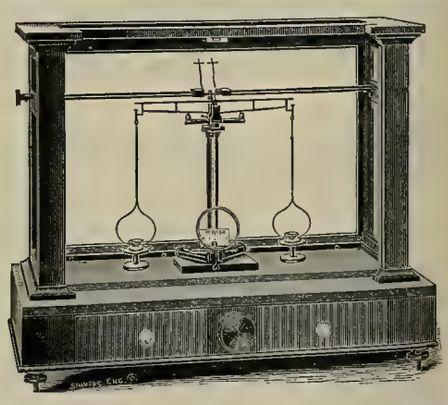

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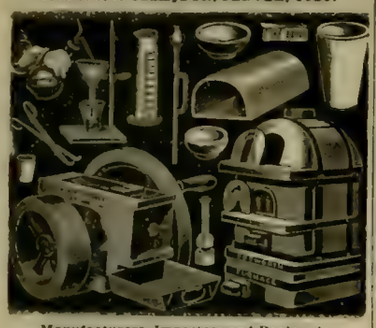

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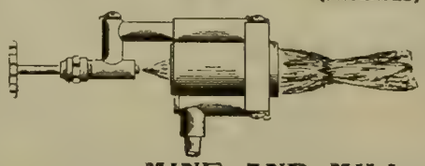

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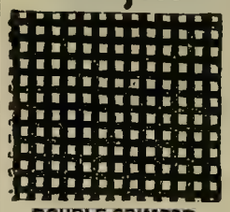

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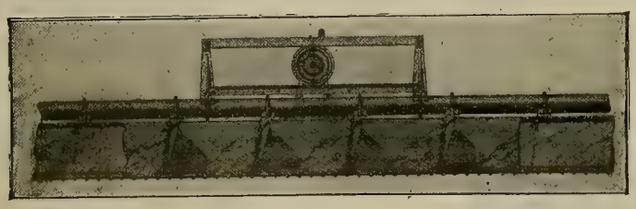

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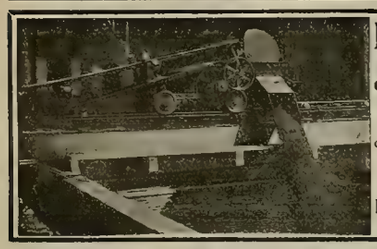

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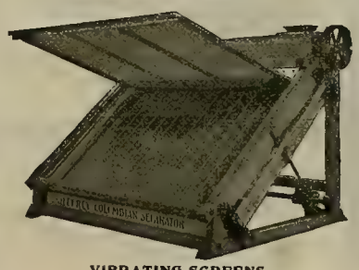

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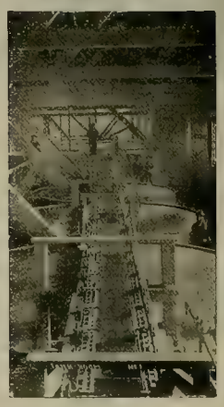

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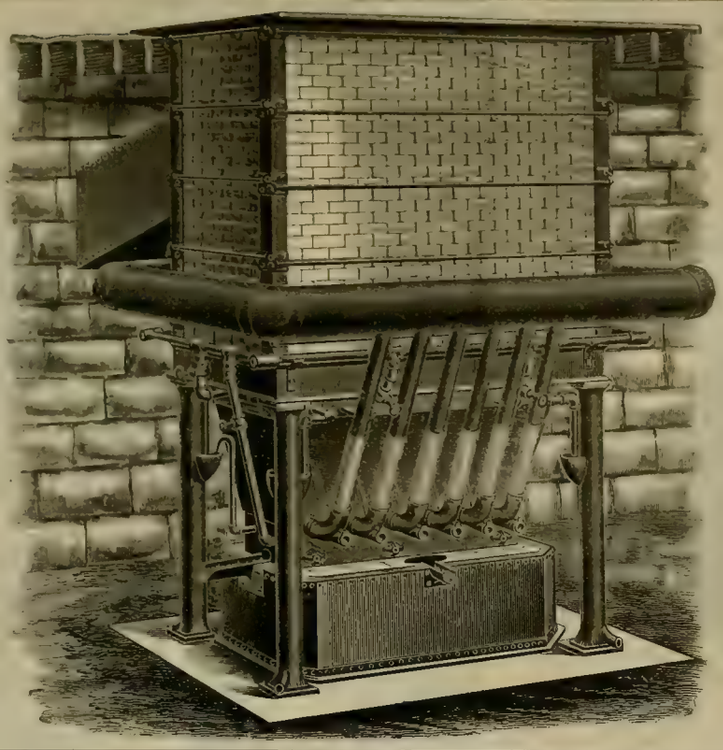

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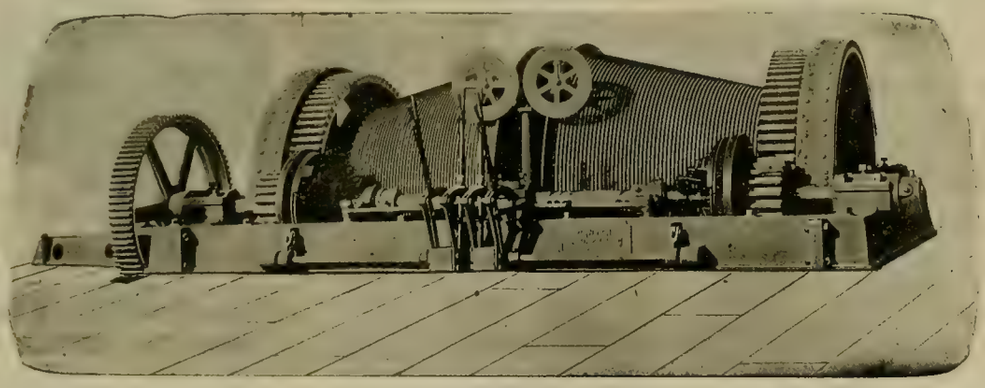

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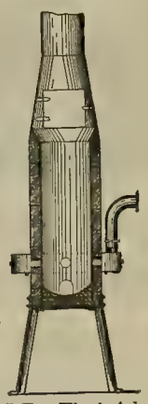

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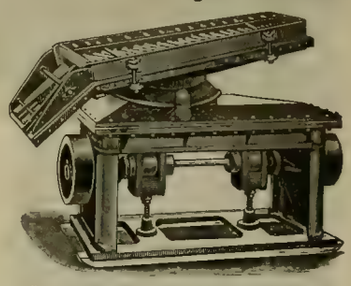

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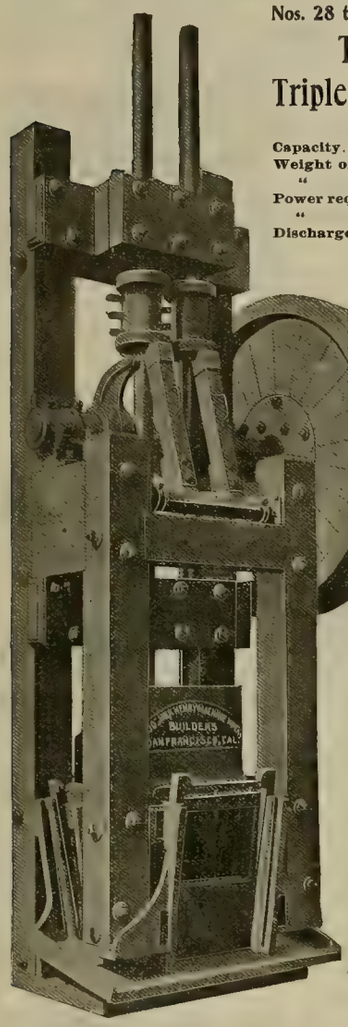

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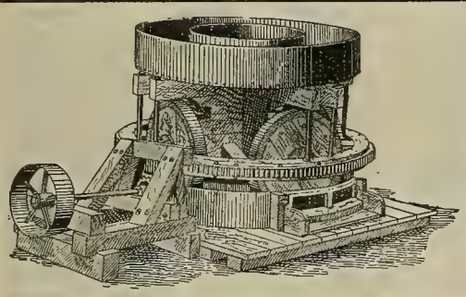

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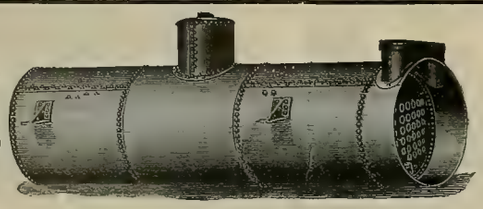

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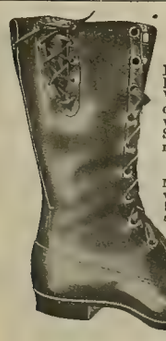

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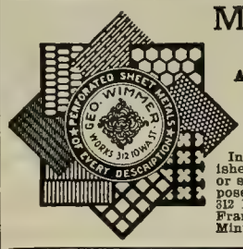

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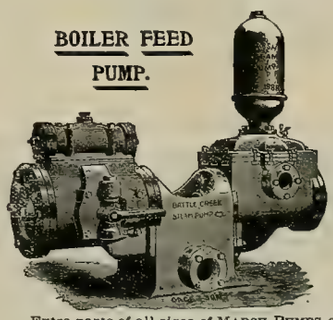

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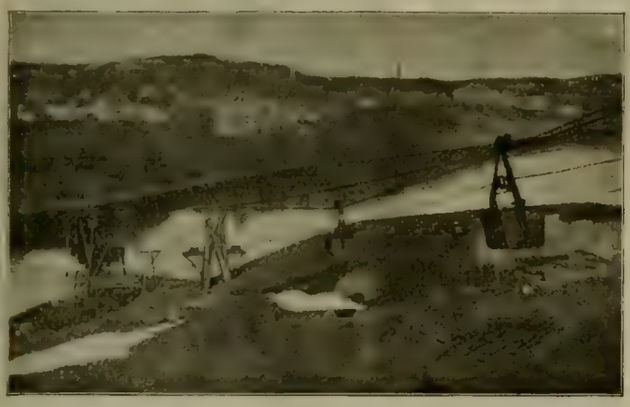

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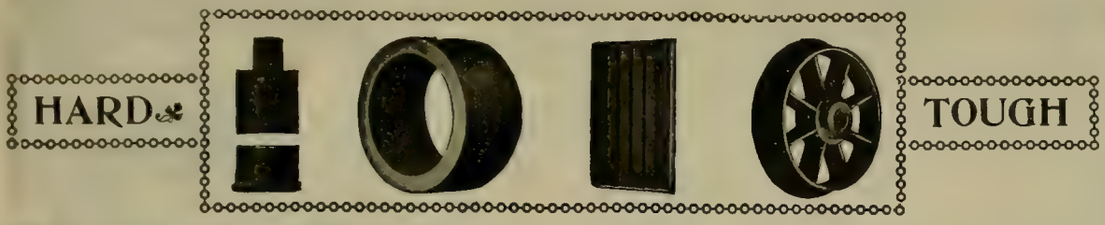

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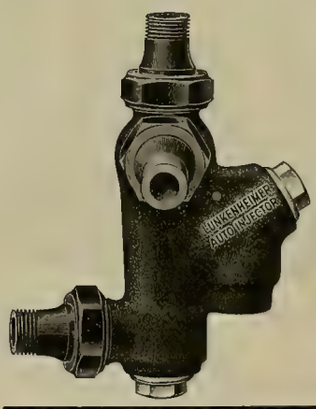

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We print in legal size, 12x36 inches, the Mine Bell Signals and Rules provided for in the Voorhies Act passed by the California Legislature. The law is entitled "An Act to Establish a Uniform System of Bell Signals to Be Used in All Mines Operated in the State of California, for the Protection of Miners." We furnish these Signals and Rules, printed on cloth so as to withstand dampness. **50 Cents a Copy.**
MINING AND SCIENTIFIC PRESS, 330 Market St., San Francisco, Cal.

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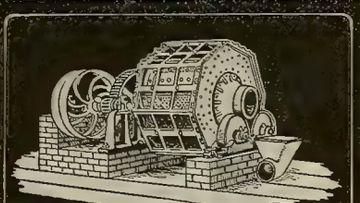

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225

ASSESSMENT NOTICES.

LARKIN MINING COMPANY.—Location of principal place of business, San Francisco, California; location of works, near Placerville, El Dorado County, California.

Notice is hereby given, that at a meeting of the Board of Directors, held on the 12th day of March, 1901, an assessment (No. 10) of two cents per share was levied upon the capital stock of the corporation, payable immediately in United States gold coin, to the secretary, at the office of the company, 112 Main street, San Francisco, California.

Any stock upon which this assessment shall remain unpaid on the 20th day of April, 1901, will be delinquent and advertised for sale at public auction; and unless payment is made before, will be sold on WEDNESDAY, the 15th day of May, 1901, to pay the delinquent assessment, together with the costs of advertising and expenses of sale.

By order of the Board of Directors.

N. F. REMINGTON, Secretary.

Office—112 Main street, San Francisco, California

MARIPOSA COMMERCIAL AND MINING COMPANY.—Location of principal place of business, San Francisco, California; location of works, Mariposa County, California.

Notice is hereby given, that at a meeting of the Board of Directors, held on the 23d day of February, 1901, an assessment (No. 21) of Ten ($10) Dollars per share was levied upon the capital stock of the corporation, payable immediately in United States gold coin, to the secretary, at the office of the company, 320 Sansome street, room 24, San Francisco, California.

Any stock upon which this assessment shall remain unpaid on the 11th day of April, 1901, will be delinquent, and advertised for sale at public auction; and unless payment is made before, will be sold on SATURDAY, the 4th day of May, 1901, to pay the delinquent assessment, together with the costs of advertising and expenses of sale.

By order of the Board of Directors.

JOSEPH H. MOOSER, Secretary.

Office—320 Sansome street, room 24, San Francisco, California.

DELINQUENT SALE NOTICE.

YUBA RIVER GOLD DREDGING COMPANY.—Location of principal place of business, San Francisco, California; location of works, Smartsville, Yuba County, California.

Notice.—There are delinquent upon the following described stock, on account of assessment (No. 2) levied on the 4th day of January, 1901, the several amounts set opposite the names of the respective shareholders, as follows:

Names.	No. Cert.	No. Shares.	Amt.
Henry Hilp	4	5	$0 15
Albert Moch	8	2,000	60 00
A. W. Goldsmith	9	2,000	60 00
H. L. Frank	14	1,000	30 00
H. L. Frank	15	1,000	30 00
H. L. Frank	16	1,000	30 00
H. L. Frank	17	1 000	30 00
H. L. Frank	18	1,000	30 00
H. L. Frank	19	1,000	30 00
H. L. Frank	20	1,000	30 00
H. L. Frank	21	1,000	30 00
H. L. Frank	22	1 000	30 00
Henry Hilp	28	500	15 00
M. E. Mayer	32	500	15 00
Hannah Heringhi, Trustee	33	300	9 00
S. Belasco, Trustee	34	200	6 00
Ed. Belasco, Trustee	35	200	6 00
Sarah Mayer, Trustee	36	200	6 00
I. Belasco	37	250	7 50
S. Belasco	38	100	3 00
Rose Haas	39	200	6 00
E. Heringhi, Trustee	40	200	6 00
Mark Thall	41	200	6 00
Louis Heringhi	48	100	3 00
Martin Freund	49	500	15 00
G. A. Kornberg	66	10,000	300 00
G. A. Kornberg	67	10,000	300 00
G. A. Kornberg	68	10,000	300 00
G. A. Kornberg	72	1,000	30 00
G. A. Kornberg	73	1,000	30 00

And in accordance with law, and an order from the Board of Directors, made on the 4th day of January, 1901, so many shares of each parcel of such stock as may be necessary, will be sold at public auction at the office of the company, Room 31, No. 214 Pine street, San Francisco, California, on TUESDAY, the 5th day of March, 1901, at the hour of 2 o'clock P. M. of said day, to pay said delinquent assessment thereon, together with costs of advertising and expenses of sale.

ALBERT CERF, Secretary.

Office—No. 214 Pine street, Room 31, San Francisco, California.

POSTPONEMENT.

By order of the Board of Directors the day of sale of the above delinquent stock has been postponed to THURSDAY, April 4th, 1901, at the same hour and place. ALBERT CERF, Secretary.

Office—No. 214 Pine street, Room 31, San Francisco, California.

DEWEY, STRONG & CO. SCIENTIFIC PRESS PATENTS PATENT AGENCY 330 MARKET ST. S.F.

DELINQUENT SALE NOTICE.

AMERICAN OIL AND REFINERY COMPANY.—Location of principal place of business, San Francisco, California. Location of works, Contra Costa County, California.

NOTICE.—There are delinquent upon the following described stock, on account of assessment (No. 2) levied on the 26th day of November, 1900, the several amounts set opposite the names of the respective shareholders, as follows:

Names.	No. Cert.	No. Shares.	Amt.
Abbott, William	720	50	$2 50
Abbott, William	721	50	2 50
Abbott, William	722	50	2 50
Abbott, William	723	25	1 25
Abbott, William	734	25	1 25
Anthony, J. C., Trustee	797	1,000	50 00
Anthony, J. C., Trustee	798	1,000	50 00
Anthony, J. C., Trustee	799	1,000	50 00
Anthony, J. C., Trustee	973	1,000	50 00
Anthony, J. C., Trustee	1021	4 300	215 00
Dignan, J. P	1039	1,000	50 00
French, Mrs. Mary L	385	2	10
Goodenough, S.	1046	380	19 00
Holbrook, W. E., Trustee	897	10 000	500 00
Holbrook, W. E., Trustee	898	11,000	550 00
Holbrook, W. E., Trustee	899	4 500	225 00
Holbrook, W. E., Trustee	900	4,500	225 00
Kielhofer, Mrs. Louis	298	2	10
Kraehmer, Louis L.	471	3	15
Laird, Mrs. L. N.	230	5	25
Lord, Mrs. Leona E.	327	2.000	100 00
Lucas, Mrs. T. R.	848	10	50
Mayer, Mrs. L.	406	800	40 00
Massey, James B.	914	1	05
McKelvey, Mrs Angelina	71	12	60
McAllister, H. L.	1071	100	5 00
Pope, Wm	656	50	2 50
Pope, Wm	695	20	1 00
Pope, Wm	764	30	1 50
Pope, Wm	908	20	1 00
Raht, Julia F.	321	25	1 25
Raht, Julia F.	453	40	2 00
Rachel, Mrs. Eliza	856	400	20 00
Royce, Lizzie A.	441	5	25
Russell, C. E.	125	3	15
Stover, W. M.	1047	480	24 00
Truitt, J. J.	399	5	25
Walser, Mark	858	1,000	50 00
Walser, Mark	859	1,000	50 00
Walser, Mark	860	1,000	50 00
Walser, Mark	861	1,000	50 00
Walser, Mark	863	500	25 00
Walser, Mark	867	500	25 00
Walser, Mark	868	500	25 00
Walser, Mark	869	500	25 00
Walser, Mark	870	500	25 00
Walser, Mark	871	500	25 00
Walser, Mark	872	500	25 00
Walser, Mark	921	50	2 50
Walser, Mark	926	5,000	250 00
Walser, Mark	927	5,000	250 00
Walser, Mark, Trustee	596	500	25 00
Walker, Mrs. S. E. D. E.	375	120	6 00
Young, R.	761	328	16 40

And in accordance with law, and an order from the Board of Directors, made on the 26th day of November, 1900, so many shares of each parcel of such stock as may be necessary, will be sold at public auction at the office of said corporation, in Rooms 322-323 Parrott building, San Francisco, California, on MONDAY, the 28th day of January, 1901, at the hour of 1 o'clock P. M. of said day, to pay said delinquent assessment thereon, together with costs of advertising and expenses of sale.

J. C. ANTHONY, Secretary.

Office—Rooms 322-323, Parrott building, San Francisco, California.

POSTPONEMENT.

By order of the Board of Directors, the day of sale of the above delinquent stock has been postponed to MONDAY, the 11th day of February, 1901, at the hour of 1 o'clock P. M., at the office of said corporation in Rooms 322-323 Parrott building, San Francisco, California. J. C. ANTHONY, Secretary.

POSTPONEMENT.

By order of the Board of Directors, the day of sale of the above delinquent stock has been postponed to MONDAY, the 11th day of March, 1901, at the hour of 1 o'clock P. M., at the office of said corporation in Rooms 322-323 Parrott building, San Francisco, California. J. C. ANTHONY, Secretary.

POSTPONEMENT.

By order of the Board of Directors, the day of sale of the above delinquent stock has been postponed to MONDAY, the 25th day of March, 1901, at the hour of 1 o'clock P. M., at the office of said corporation in Rooms 322-323 Parrott building, San Francisco, California. J. C. ANTHONY, Secretary.

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DELINQUENT SALE NOTICE.

ALLIANCE EXPLORATION & MINING COMPANY.—Location of principal place of business, San Francisco, California; location of works, Ophir, Placer County, California.

Notice.—There are delinquent upon the following described stock, on account of assessment (No. 3) levied on the 12th day of February, 1901, the several amounts set opposite the names of the respective shareholders, as follows:

Names.	No. Cert.	No. Shares.	Amt.
T. Bielenberg	7	200	$4 00
T. Bielenberg	34	200	4 00
T. Bielenberg	44	400	8 00
T. Bielenberg	73	100	2 00
M. G. Mucovich	9	50	1 00
S Zenovich	10	50	1 00
F. S. Johnson	17	200	4 00
I. Abrams	30	200	4 00
I. Abrame	31	200	4 00
I. Abrams	70	100	2 00
I. Abrams	126	2 000	40 00
D Davis	45	400	8 00
D. Davis	71	200	4 00
D. Davis	90	200	4 00
Chas. D. Simon	48	120	2 40
Mrs P. Herleman	49	100	2 00
H. Seller	61	400	8 00
Cliff J. Graham	62	600	12 00
Cliff J. Graham	102	200	4 00
Emile Hirsch	68	200	4 00
May C. Hoppell	88	250	5 00
Irving Watson	100	400	8 00
Daniel Nevins	101	400	8 00
L Kalmuck	108	100	2 00
L. Kalmuck	172	5.600	112 00
Albertina Davis	110	500	10 00
L. Hirsch	112	2.000	40 00
F. Misch	127	200	4 00
J. B. Toplitz	128	1,000	20 00
J. B. Toplitz	129	1.000	20 00
J. B. Toplitz	144	1 000	20 00
J. B Toplitz	145	1 000	20 00
J. B. Toplitz	146	1 000	20 00
J. B. Toplitz	147	1.000	20 00
J. B. Toplitz	148	1.000	20 00
J. B. Toplitz	149	1.000	20 00
J. B. Toplitz	150	1 000	20 00
J. B Toplitz	151	1 000	20 00
J. B. Toplitz	152	1,000	20 00
J B Toplitz	1 3	1 000	20 00
J. B. Toplitz	154	1 000	20 00
J. B. Toplitz	155	1 000	20 00
J. B Toplitz	156	1,000	20 00
J. B. Toplitz	157	1,000	20 00
J. B. Toplitz	158	1 000	20 00
J. B. Toplitz	159	1 000	20 00
J. B. Toplitz	160	1 000	20 00
J. B. Toplitz	161	1 000	20 00
J. B. Toplitz	162	1 000	20 00
J B Toplitz	163	1 000	20 00
J. B. Toplitz	164	1 000	20 00
J. B. Toplitz	165	1 000	20 00
J. B. Toplitz	166	1,000	20 00
J. B. Toplitz	167	1,000	20 00

And in accordance with law, and an order from the Board of Directors, made on the 12th day of February, 1901, so many shares of each parcel of such stock as may be necessary, will be sold at public auction at 236 Sutter street, San Francisco, California, on MONDAY, the 8th day of April, 1901, at the hour of 3 o'clock P. M. of said day, to pay said delinquent assessment thereon, together with costs of advertising and expenses of sale.

S. GOLDSMITH, Secretary.

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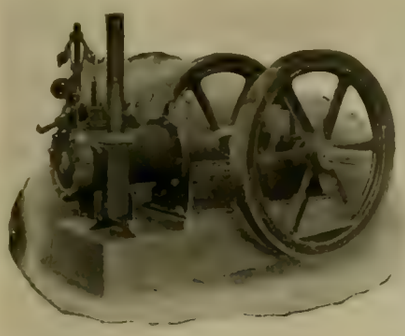

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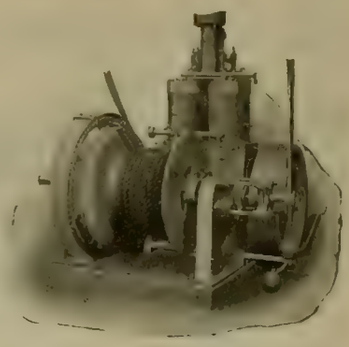

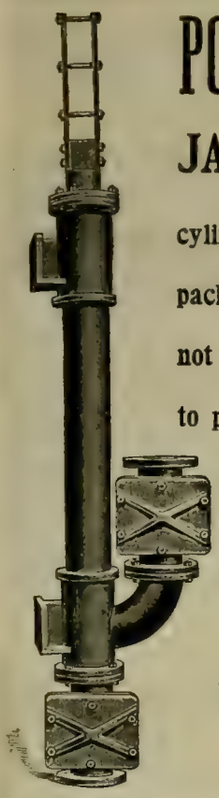

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Pumps sand and grit without injury to cylinder.

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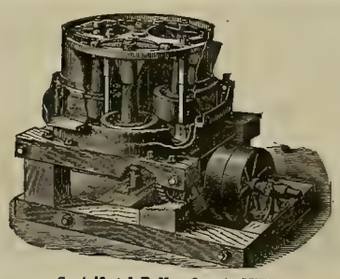

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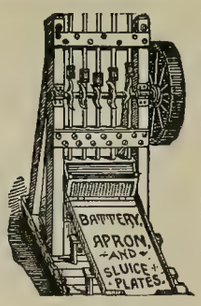

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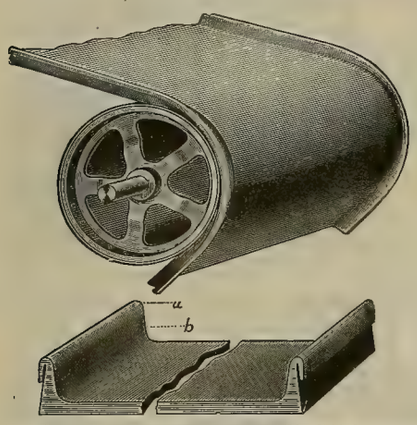

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SUPT. OFFICE WILDMAN GOLD MINING COMPANY,
SUTTER CREEK, AMADOR CO., CAL., Feb. 22, 1897.

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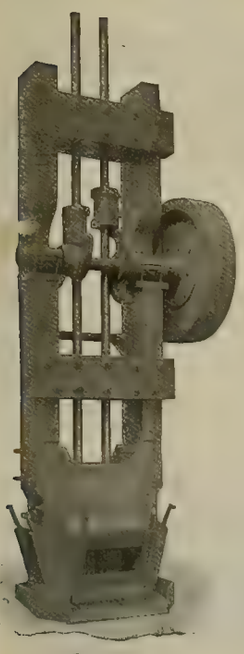

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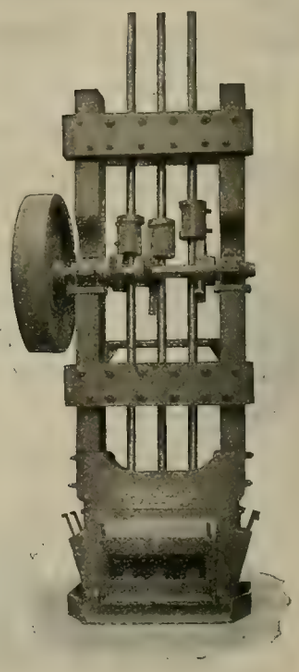

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MINING AND SCIENTIFIC PRESS.

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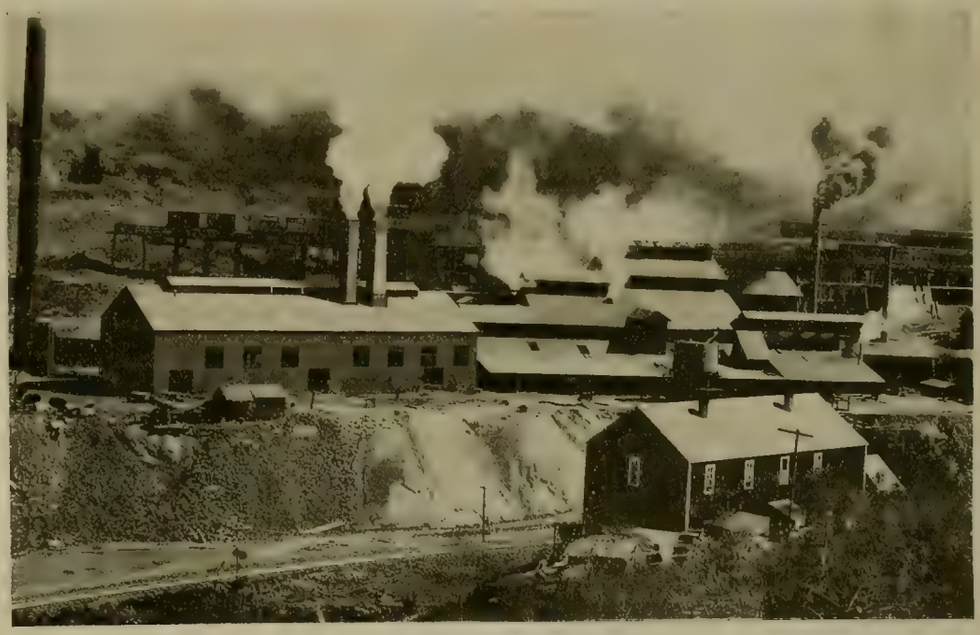
In the Black Hills.

To the right of these lines is a good portrayal of the general appearance of the D. & D. Smelter at Deadwood, Lawrence county, South Dakota, a prominent institution in the commercial center of the Black Hills mining region. The only flux not found in the Black Hills is copper ore, now shipped from Butte, Mont., though from recent reports sufficient copper ore will be shortly forthcoming nearer home, the Montezuma mine at Deadwood now furnishing iron ore and a little copper.

In the Central Hills, in Pennington county, is the Holy Terror mine, in Keystone district, being to that section what the Homestake is to the Northern Hills. In the lower left-hand corner of this page is a representation of the stamp mill of that mine at Keystone. The mine is a steady dividend payer; the ore is partly free-milling, partly sulphides, the company now experimenting with the cyanide process. What is known as the Keystone belt of ore is considered the largest and best defined in the Black Hills. The B. & M. R. R. Co. has built a spur line from Hill City to Keystone, cutting through this ore belt. From the Southern Hills, in Custer county, comes this week a statement that tin in paying quantities has been discovered at the mica mine of Dows & Co.



D. & D. Smelter at Deadwood, South Dakota.

U. S. Mining Law Amendment.

The Senate committee on mines and mining, to whom was referred the bill to amend the mining laws of the United States, have reported it back with an amendment in the nature of a substitute. They argue that the intent and meaning of the mining laws have been wholly disregarded in locating placer mining claims in Alaska and in the attempted location of oil lands in California. In Alaska single individuals, by means of powers of attorney and other devices, monopolize vast tracts of mineral lands upon which no labor is performed, thus greatly retarding development of the country and depriving bona fide miners of the opportunity to explore and develop mines and obtain title. The bill reported by the committee repeals all laws allowing one person to locate for another, and requires $100 worth of development work upon each location within a year from the date thereof, and on all claims heretofore located it requires the development work to be done before the 1st day of October, 1901, and in every year thereafter.

In California a few persons have attempted to locate hundreds of thousands of acres of petroleum or oil lands under the placer mining laws; and petroleum discoveries have only been made or attempted on a very small percentage of these claims. The existing placer mining laws, which the courts and the general land office hold to require an actual discovery of mineral or petroleum as the very basis of a placer mining location, are not adapted to the acquisition of petroleum lands, owing to the fact that petroleum, unlike placer gold, is rarely found upon or near the surface, and can only be discovered by expensive drilling operations. Hence these laws do not apply or give rights to the prospector prior to an actual discovery of oil during the time necessarily consumed in drilling discovery wells. As the claimant acquires no right by the mere attempted location, prior to an actual discovery of mineral or oil, his claim is subject to exploration by any rival claimant, and the first to discover mineral or oil will acquire the better title, regardless of the priority of attempted locations. It is therefore clear that lands supposed to be valuable for oil, but upon which no oil has been discovered, are open to acquisition under the agricultural land laws; but these laws are not alone adequate to meet the situation, as such scrip, land warrants, and forest-reserve lands, with which supposed oil lands may be acquired, are limited in quantity and held by private parties, and therefore not readily obtainable. In view of these considerations, the committee believes that the placer mining laws are not applicable to lands supposed or believed to contain petroleum, but upon which no discoveries have been made. The practice of using those laws to monopolize large areas of land, without title and without assurance of protection to those exploring and investing thereunder, operates to retard rather than to advance the development of the oil resources of the country, and leads to strife and contention. The committee believes that an opportunity should be given to purchase from the Government such lands, in limited quantities, to those who make affidavit that the same is believed to be valuable for petroleum. The bill which the committee presented is intended to permit this without interfering with the right to acquire under the placer mining laws lands upon which oil discoveries have actually been made, as it is only to such lands that the existing law is applicable. The committee's bill gives the privilege of purchasing lands which are believed but are not known to contain oil, in tracts of from 10 to 160 acres, at $2.50 per acre.

Holy Terror Stamp Mill at Keystone, South Dakota.

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IN a Colorado mining suit, on July 27, 1900, the Commissioner of the General Land Office decided that, in locating a mining claim, the lines or stakes could not be put on patented ground by the applicant. From this decision appeal was made to the Secretary of the Interior, who now reverses the decision of the commissioner and says: "Any of the location lines of a lode claim may, if established openly and peaceably, be laid within, upon or across the surface of patented lode mining claims for the purpose of embracing and including the discovery vein and all other veins apexing within the free and unappropriated ground within such location lines, and the ground itself as well, and of defining and securing extralateral underground rights upon all such veins."

IN admiring the great things now being done on so large a scale in the mining world there is in some cases insufficient attention given to the needs of the small mines, the necessity for a method of treatment of ores so that the owner of a little mine can have as much proportional opportunity to profit by improved economical processes as the owners of large properties have. The tendency of much of the present mining literature is to convey the idea that no one can run a mine any more unless he turn it over to a big combination; that the era of trusts and combines takes in the mining industry as well as everything else. This is not a good idea to have prevail. The ocean, bays and rivers could not exist without the little rills and feeders, and the day that the prospector and small miner gets it fairly in his head that he can't do anything unless he has access to a half million dollars will be a bad day for the mine combine or trusts of any size. The tendency of the times is to inculcate the idea in the prospector's and miner's mind that as soon as he has found mineral in place, or demonstrated that a mine can be made, that he must immediately step aside and let others make it. It is just as needful as ever that the miner shall be resourceful, shall be able to secure the necessary requirements to work his property on a small scale as a large one, and if this be available the number of producing mines will increase; if it be unavailable, then the number will diminish. Far be it from any one to decry or deny the grand advance in economical mine management and the manipulation of mine products on a great scale in a cheaper way with commensurate profit, but it is not business to push to its ultimate conclusion the idea that all that is left to the prospector or miner is the rudimentary discovery of the "prospect," and that he is to be relieved of all trouble as to transportation or treatment.

Varying Conditions.

In the issue of the 2nd ult. was an editorial article, "Barren Zones," in which, after discussion of what a "barren zone" is, it was stated that nerve and money had demonstrated the existence of paying ore bodies below such barren zones.

That is not, however, to be considered as an infallible rule, or unvarying condition. In this, as in all other things relating to mining, local conditions and circumstances govern the case.

The subject has practical illustration in the case of the Drum Lummon mine, Marysville, Montana, once a great property and a big dividend payer. Its present owners, the Montana Mining Co., held a meeting in London on the 12th inst., at which time Manager Burrell made personal report to the directors of the last half year's operations in 1900.

From the first discovery to the year 1886 the ore from the surface to the 400-foot level was high grade; below that level the ore bodies decreased in size and value of ore, and below the 800-foot level several of the ore shoots gave out. A few small bodies of low-grade ore held on to the 1000-foot level, but below that the little ore that was found did not pay for treatment.

At this point the late Prof. Clayton was called upon for an expert opinion, his advice being that below the "barren zone" the vein might again become productive. It was, therefore, determined to sink 600 feet deeper, and this has been done, with barren result. There has been also additional development work from that 1600-foot level—crosscuts, drifts and upraises aggregating 5000 feet—with nothing to indicate that the "barren zone," which has been proven to extend from the 800-foot to the 1600-foot level, may not extend to farther indefinite depth. Accordingly, having expended in the six months ending December 31, 1900, $51,482.33 in such development work on the 1600-foot level, with such discouraging result, the directors have called a halt, to take counsel as to what they had best do—continue sinking or quit.

The directors emphatically assert their belief that it is money thrown away to continue further exploration in that part of the mine, and say that should the majority of the shareholders determine to continue such exploration they (the directors) "are not disposed to associate themselves with such a policy." This belief of the directors is shared by the resident manager.

This particular mine and its present condition is merely referred to as affording a practical object lesson and an interesting exposition of the whole subject of barren zones, and forms a case in point. It is probable that the opinion of the directors and the manager will prevail, and that the work of exploitation for resumption of ore below the "barren zone" shall stop. In such case the question remains an open one, though from the zeal and thoroughness with which the work has been done there is good ground for the negative argument of the directors. But, as in all such cases, it proves nothing; it neither strengthens nor weakens the main general question, and affords no means of judgment for action in a mine that might adjoin it.

The report shows profitable operation of other parts of the mine during the six months indicated, there having been extracted from the upper levels 7801 tons ore, yielding in bullion bars and concentrates $66,289.75, an average of $8.50 per ton. Mining and milling expenditures in connection therewith were $53,899.90, an average of $6.91 per ton. During the same time 72,518 tons tailings were cyanided, producing $195,544.57, an average of $2.70 per ton. The total treatment, including redemption of cost of the cyanide plant, aggregated $99,275.31, being $1.37 per ton, a net profit in that part of the mine work of $96,296.26, or $1.33 per ton.

In Calaveras Co., Cal., the Gwin mine, with an ore shoot over 1300 feet long, a steady dividend payer, was shut down; low-grade ore only was produced for the first 400 feet. Between the 400 and 900 foot levels $10 ore was found. The mine paid about $2,000,000 in dividends before being shut down. Plucky California miners with two requisites for every miner—"nerve" and money—spent about $250,000 in further exploitation of the mine, with the result that for several years past the Gwin is one of the regular dividend payers of the State. The Kennedy mine, in Amador Co., Cal., the deepest worked of any mine in California, was sunk and explored to a depth of 600 feet, and shut down because the ore was of too low grade to pay. Like the Gwin, men who had faith went ahead, for, as in religion, so in mining, "faith without works is dead," and made the Kennedy famous. Last week in this column was chronicled the finding of rich ore in the Kennedy, at a point 3000 feet below the croppings. One more California case may be cited—the Eureka, Sutter Creek, Amador Co., Cal.—where the first 400 feet gave ore assaying $2.50 per ton. Subsequent workings to the 1200-foot level gave an output of $15,000,000.

It is to be said in general that every pay ledge has barren places, and every mine, great or small, has barren zones. In the natural forces that created the mountains it is reasonable to assume that pay ore and barren quartz were alike upheaved.

THE homely art of grubstaking and the co-operative method of mining should not be overlooked in all the current talk of great schemes and big things. It is not vouchsafed to everybody to be in on a million-dollar deal, nor is it always desirable; but in a small way as a safe proposition it can always be recommended to everybody, resident and non-resident, in mining localities that the business of mining can be done without much risk or parade. There is getting to be too much attention given to the big things and not enough devoted to the minor enterprises, and, after all, it is these smaller projects that maintain the mining industry and keep up attendant industries. Where people know their men it is always in order to form co-operative effort in the way of prospecting and developing. There are few places that can not afford, say, ten men who could weekly put up $5 each for a prospecting fund and keep, say, two prospectors in the field. The $50 a week would be sufficient, for if they are real prospectors the two men out would want no more than their expenses and would be willing to take pro rata interest in the probable discoveries as part pay. When these prospectors have a good prospect it would be then in order to furnish them sufficient money to partially develop it and see if it were worth being made into a mine. If it so showed, that would be about the time to have some one who knew more about it than the ordinary man give expert opinion thereon as to whether the claim should be given further development, which would involve the purchase of a little machinery and more outlay. It might be that a sale or bonding would be more satisfactory. Without any outlay for offices or top heavy expenditure a comparatively small amount could be made to do a good deal in the way suggested, and it is in that way that some of the biggest mines in the country to-day were first called into being.

IN an attempt to sell a prospect the simplicity of truthfulness is sometimes not given its just value. In trying to interest capital the owner of a prospect will best serve his own interests by stating the exact facts as he knows them, and let the investor do all the theorizing. The truth is usually good enough, and helps those who stick to it. Rarely does a prospector aid his cause by misrepresentation of anything in connection with his claim. And no investor ever examined a claim which he found to have been willfully misrepresented who did not go away with a bad opinion of that whole district.

WORTHLESS and fraudulent schemes are being presented to miners everywhere of small portable smelters "guaranteed" to do wonderful things, greatly to the loss of any one credulous enough to believe what those lying circulars say. The matter is again referred to here as illustrative of the fact that there is a constant need and demand for small smelting and machinery plants, and it is the knowledge of this that makes such fellows as Hartsfeldt so successful in working off their worthless productions.

CONSIDERABLE in the way of mining evolution has been done in the Black Hills, and the economy of modern mining methods finds full expression in that region. At the Deadwood-Tierra mine a 160-stamp mill has crushed 15,000 tons of ore per month, averaging $1.80 per ton, at a total cost for mining and milling of $1.40 per ton.

Concentrates.

ABOUT 3900 California mining properties have been surveyed for patent.

A BRAZING SOLDER for copper, iron or brass is made of equal parts of copper and zinc melted together.

THE Temescal, Cal., tin mine produced 143,400 pounds tin during 1892. It has not been worked since that year.

THE limit of distance to which the sound of the voice can be distinctly conveyed in a straight pipe is about 1700 feet.

AN injector forces water into a boiler because the area of the steam nozzle is greater than the area of the combining tube.

A PROCESS to use liquefied air in cyanide treatment was patented about eighteen months ago, but nothing practical has come of it.

THE specimen from Chloride, Arizona, is cerusite, a rare form of lead ore in the form of small white needles, slightly resembling asbestos.

SO LONG as China and India exist there will always be "a future for silver," and it is not likely that its price will fall far below present quotations.

AT an elevation of 9000 feet above sea level the barometer indicates 21.22 inches, and the efficiency of an air compressor would be 75% of that at sea level.

IN 1897 the cost of mining, freight and treatment of ore from Republic, Wash., was nearly $40 per ton. Ore at that camp can now be treated for $10 per ton.

THE Arizona Supreme Court last week decided that no lien shall hold against a leased mining property in that Territory for indebtedness incurred by the lessee.

IN 1886 but 58% of the New York value of entire contents of one ton of ore was paid the Utah miner by silver-lead smelters; in 1897, 62.6%; in 1901, about 69%.

IN the borax mines of Daggett, San Bernardino Co., Cal., the deposit is borate of lime, not in the crystalline form, but as a mud shale, containing about 10% boracic acid.

TURQUOISE of varying quality is produced in northern Arizona. From mines near Silver City, New Mexico, comes nearly 5% of the world's present supply of that gem.

GROUND GLASS is deemed an excellent flux for cyanide slimes. The charge for melting is fifty pounds white glass and fifty pounds borax to each 100 pounds of roasted slimes treated.

THE new law passed by the Colorado Legislature gives tunnel companies in that State the right of way through mining claims, the owners of the latter being protected in their rights.

COBALT is found in California 2 miles north of Cisco, Placer county, cobaltine, a silvery white mineral with reddish tinge, occurring as impregnation in a mica schist near the granite contact.

IN the State of Nevada to hold a mining location, within ninety days after the posting of the notice, the locator must sink a discovery shaft to a depth of at least 10 feet, or run a cut or tunnel equivalent.

THE best conductor for the electric current, meaning by "best" that which offers the least resistance to the current, is silver; after silver come in order copper, gold, aluminum, zinc, platinum, iron, nickel, tin.

BOTH Melbourne and Sydney, Australia, have mints. At the former institution the charge for melting, assaying and refining in lots of 1000 ounces gold, or over, is 4½ pence per ounce; in the latter, 3 pence.

IN law, illuminating oil, oil used for lubrication, other lubricants, gasoline used for fuel in a mining plant, can not be considered as enhancing the value or becoming part of the machinery, and, hence, is not lienable.

THIS PAPER constantly proffers the use of its pages in the exchange of practical ideas and experiences, of methods of doing work and of effecting improvements and economies which sometimes escape the notice of the less observing.

UNDER the statutes of the State of Idaho, a location notice of a mining claim which fails to give the direction of the initial point or permanent monument to which it is attempted to tie the location, from the point of discovery, is void.

THE noise and odor of gas and oil engines may be considerably suppressed by placing inside of or on the top of the cast iron chamber in which the products of the explosion are generally received, a few scrubber rings, such as are used in gas works.

COURTS have decided that the words "trustee" or "agent," following a name on the face of a certificate of stock, practically mean nothing, being merely "words of description," and that the stock belongs to the person whose name is on the stock.

IN assaying copper bullion when there is more gold than silver in the sample, it takes considerably more lead to scorify or cupel away the copper than when there is an excess of silver over gold, the latter being more tenacious of copper than silver is.

A BARREL of California petroleum of average quality will furnish 10 gallons kerosene worth 15 cents per gallon, 5 gallons benzine worth 16 cents per gallon, 5 gallons gasoline worth 17 cents per gallon, 10 gallons lubricating oil worth 16 cents per gallon and 50 cents worth asphaltum—a total of $5.25 from a barrel of crude oil worth for fuel purposes much less. In the separation and refining of these products lies much of the value and profit of the oil industry.

A STEAM ENGINE that develops 55 H. P. with 37.5 pounds mean effective pressure per square inch when running at 184 revolutions per minute, would develop 82.315 H. P. when running at 246 revolutions per minute with a mean effective pressure of 42 pounds.

THE standard horse power rating for boilers, as adopted by the American Society of Mechanical Engineers, is an evaporation of thirty pounds of water from a feed water temperature of 100° F. into steam at seventy pounds gauge pressure as the equivalent of 1 H. P.

DRY STEAM contains no moisture and may be either superheated or saturated. In the latter case it is usually called dry-saturated steam. Wet steam has the same temperature as dry-saturated steam at the same pressure, and contains moisture, usually as mist or spray.

WHERE two veins, having apexes in different claims, unite in their dip within the perpendicular extension of the side lines of another claim, the owners of the last claim can not control as to the rights in the vein beyond the point of union, since they have no interest in either vein.

GALENA carrying thirty ounces silver per ton, 10% lead and 12% sulphur admits of slag roasting without material loss; where the lead percentage is over 10%, but not over 20%, smelters say such ore should not be more than sintered; when over 20% the charge should be only plain roasted.

THE proper amount of heating surface per horse power for boilers in stationary plants is: For horizontal tubular boilers 12 square feet, and for water tube boilers 10 square feet, the boilers being in each case capable of being forced economically to between 50% and 60% above the rated capacity.

AFTER a commutator becomes slightly worn, a copper brush will give better results while waiting for a chance to turn the commutator down, than a carbon brush; but the carbon brush will wear more evenly, so that, starting with a new machine in first-class order, carbon brushes are the best.

ALL unoccupied lands of the United States containing salt springs or deposits of salt in any form, and chiefly valuable therefor, are subject to location and purchase under the provisions of the law relating to placer mining claims. The same person cannot locate or enter more than one such claim.

TO PREVENT spontaneous combustion of coal on sea voyages the coal should not be loaded earlier than one month after it is mined, should be stored only on iron floors and should be covered. The height of the heap should not exceed 7½ feet and steam pipes and flues should be at least 20 feet away.

IN the decomposition of iron pyrites the sulphide becomes a sulphate, which, when further oxidized in the presence of water, is resolved into sulphuric acid, and hydrated oxide of iron. The gold intimately mixed with the pyrites, mayhap originally deposited therewith, remains, being insoluble in the waters which dissolved the iron.

THERE is abundance of antimony deposits in California, but few are worked, chiefly because of the cost of smelting, where the ore is treated for the antimony alone. The ore may run 40% antimony and $50 gold per ton, but the gold does not count in ordinary smelting, as it would ordinarily cost more to separate it from the antimony than it is worth.

A ¾-INCH NOZZLE, under 100 pounds pressure will, theoretically, discharge 1170 gallons per minute. The theoretical discharge of water from a nozzle may be found by multiplying the area of the orifice expressed in square feet by the velocity of the water in feet per second. The product will be the theoretical discharge in cubic feet per second, which multiplied by 7.5 will give the number of gallons.

IN a gas engine in which a piston igniter is used there is required a projection upon the piston, and in such a position that it is far removed from the water jacket, so that it may become heated to a degree which causes it to operate in the same manner as a hot tube, for the compression of the charge produces a rise of temperature which causes the mixture to ignite more readily than when it is at the ordinary temperature of the atmosphere.

A TON OF COAL carbonized in gas works yields generally 10,000 to 11,000 cubic feet of gas, which hold in diffusion twenty to twenty-four pounds of hydro-carbon vapors, including sixteen to eighteen pounds of benzol, about 120 pounds of liquid tar, of which twenty-five to thirty pounds are carbon held in suspension, two or three pounds are hydro-carbons similar to the vapors above mentioned, and twelve to fourteen pounds are naphthalene.

LIME MORTAR should never be mixed with concreting. Concrete should consist of one part Portland cement, two parts clean sharp sand, two parts clean gravel, thoroughly mixed with sufficient water to form a hard, solid mass when well beaten down into a bed, which should be from 2½ to 3 inches thick. If the concrete bed can be made over 3 inches in thickness, the concrete can then be made of one part natural cement, one part clean sharp sand, one part clean gravel, thoroughly mixed with sufficient water as above directed. For floors the surface of the concrete must be level and finished to within 1 inch of the finished floor line, when tile ½ inch thick is used, which will leave a space of ½ inch for cement mortar, composed of equal parts of the very best quality Portland cement and clean, sharp sand.

COBALT is used extensively in the arts and in the manufacture of dyes, producing a bright purple coloring matter, its use being confined almost exclusively to Europe. In this country there is but one manufacturing plant using oxide of cobalt—the American Nickel Works, Camden, N. J. This company gets its cobalt from Canada in the shape of nickel matte, and uses it only in connection with the manufacture of nickel.

DISTILLATE is freely and frequently used in gas engines, it having a gravity of from 35° to 56°. The lower grades are sometimes dirty and have a tendency to foul the engine; but, if before the engine is shut down the distillate is turned off, and gasoline turned on for a few minutes, the engine is cleaned and that trouble obviated. It is cheaper than gasoline, goes further but necessitates that the engine be run with very hot air; and, rightly used, is generally satisfactory.

THE newspaper report of a railroad collision is away behind the times where it says that when the engineer saw the danger "he whistled 'down brakes,' reversed the lever, and jumped off." No one on a modern railway freight or passenger train knows or hears anything of "down brakes." The locomotive engineer who sees impending collision shuts off steam, applies the air brake, opens the sand valve, and then (if he has time) jumps. Doing all but the last takes about five seconds. A railway engineer wouldn't reverse the engine after the air brakes had been applied, as such reversal would reduce their resisting power.

ONE may generally count upon a practical working efficiency of 80% in a hydraulic motor, i. e., the power communicated to the pump is 80% of the water power expended. This is only true when the head is measured close to the wheel. When, as is sometimes the case, the head appertinent to the water power represents the descent from the pond or canal to smooth water below the wheel, not more than 75% can be practically assumed. A loss of as much as 12% may be expected in pumping, and ordinarily as much as 5% in transmission through the pipes. An efficiency of 80% may be assumed in the motors through which the water acts to drive machines. Thus, the percentage of gross power which can be imparted to machinery at a distance of a mile or more from the source is not more than $0.75 \times 0.88 \times 0.95 \times 0.80 = 0.50$.

THE wear on a narrow mortar is rapid when hard ore is crushed, and it is always preferable to introduce steel liners. Wear is especially great just back of the middle stamp. In case of a hole in the back a quick repair may be made by using the principle employed in closing a hand-hole in a boiler. Have the blacksmith set a bolt ¾ inch by 6 inches in a plate of steel of suitable size, the bolt having a long thread on the end opposite the plate. Put washers or gaskets of belting or gasket rubber of a size and shape to roughly conform to the worn place in the mortar on the bolt and next to the plate. From the inside of the mortar push the bolt end through the hole, the plates and gaskets, of course, remaining outside. Then, from the outside, add another gasket or two and a large cast iron washer, upon which set a nut, and complete with a jam-nut. This is a "blacksmith's" job, but it is effective and renewable, and can be made to wear out the rest of the mortar, meantime saving a shutdown and attendant loss.

THE most important product of petroleum is that portion which passes over at temperatures above 183° C., and which constitutes what is usually known as kerosene—various other trade names being applied to it in different degrees of purity, and by different manufacturers. In the manufacture of these burning oils care must be taken that the more volatile compounds are separated, and that the temperature be not pushed too high; in the latter case the oil is cracked, i. e., the denser oils remaining in the still are dissociated, forming highly volatile compounds, which mix with the product. In either case the kerosene is liable to give rise to accidents, either by igniting, in case the lamp is broken or overturned, and, in very bad oil, by forming with air a mixture which may explode the lamp. In order to guard against such accidents, laws have gradually been framed in various States and countries, regulating the manufacture, transportation, sale and storage of these oils. The tests to which they are subjected relate to the temperature at which they give off inflammable vapors and at which they ignite. The tests are applied by gradually warming the oil and noting the temperature indicated by plunging a thermometer in it, at a time when a lighted match carried over the surface produces a flash, and the temperature when the oil itself ignites; the former is known as the "flashing point," the latter as the "burning point;" the former is about 5° to 8° C., or 10° to 15° F., below the latter. It was formerly supposed that an oil flashing at 43° C. or 110° F. was safe; but subsequent experience has shown that kerosene gives off explosive vapors at a temperature 5° to 8° C., or 10° to 15° F., below the flashing point, and 14° to 17° C., or 25° to 30° F., below its burning point, and serious accidents have resulted from the use of oils of 110° flash. A kerosene is now required, therefore, to have a flash point of 60° C., or 140° F., and a burning point of 65.5° C., or 150° F.; an oil of lower test is unsafe.

Oil Engines in Mining and Milling.

Written for the MINING AND SCIENTIFIC PRESS by A. W. WARWICK.

In mining and milling in the arid zone or above timber line, water and fuel economy is highly important. In the initial stages of the work, in such localities, animal power is greatly used. When, however, animal power becomes too expensive or slow, and mechanical power is required, we need a motor (1) that requires little or no water; (2) that utilizes to the utmost limit the potential energy of the fuel; (3) that is safe. These conditions are more or less fulfilled by the gasoline, distillate, oil or petroleum engines, as they are variously called. In southern California and Arizona practically all such motors use a petroleum product of greater density than gasoline; it is, therefore, a misnomer to refer to such engines as gasoline engines. Year by year heavier petroleum products are being used, and hence the best mechanical writers use the term petroleum engines, in preference to the other terms, as it includes the whole. The application of such engines to mining work has greatly extended during the last few years, for hoisting, pumping, air compressing and mill and electric light work around mines.

It would be useless to deny that a great prejudice exists against such engines; so many failures and accidents have been recorded during the last few years that this prejudice is very excusable. Still, we know that steam plants are not free, by any means, from accidents. On an average nearly two boiler explosions occur daily throughout the United States, and the casualties amount to hundreds annually. It may be remembered that during 1898 many failures of petroleum engines occurred. As the writer was about to purchase such an engine at that time, investigation was made into the causes of the accidents and failures. In almost every case there was either gross carelessness or ignorance. Overloading, overheating of cylinders and tampering with the ignition point while running were the chief causes of failure. In the majority of the cases the "accidents" should never have occurred.

While speaking of accidents, a reference may be made to some statements of petroleum engine manufacturers. They say, for example, that any unskilled man can run such engine, because it is so easy to start and stop. This is correct when the engine is in good shape; but how is it when anything gets out of order? Surely an unskilled man would be helpless. The manufacturers, by sending out their engines to be handled by roustabouts, are very largely responsible for the prejudice existing against their machines. The absolute facts are these: Any man with good intelligence can run the machine, i. e., start, stop and oil it, but at least one man should be around who can see that the engine is kept in shape and who can make the necessary adjustments with accuracy. The engine works perfectly automatically when in good order; it therefore requires but little attendance under such conditions; if, however, the engine "bucks," a good man being at hand will prevent many a vexatious delay.

The petroleum engine only differs from the gas engine in a few details. They nearly all work on the same principle, viz., the four cycle or Otto principle. The cycle is as follows: (1) The piston on its outward stroke draws in air and oil spray; (2) on its return the mixture of air and oil vapor is compressed; (3) nearly at the end of this compression stroke the explosive mixture is ignited, and the force of the heated air and products of combustion force the piston outwards; (4) on the next return stroke of the piston the burnt gases are expelled and the engine is ready to perform the same functions again. This cycle was first enunciated by Beau de Rochas and first applied by Otto in his gas engines, and to it is due the great efficiency of these motors.

In carrying out its work economically this engine requires careful attention to the following points, (1) cooling of cylinder, (2) correct point of ignition of explosive mixture, (3) close governing, (4) absolute action of petroleum pump, (5) thorough lubrication, (6) selection of the most suitable petroleum product.

COOLING OF CYLINDER.—It is generally accepted that to get the best work out of the petroleum engine that the temperature of the cylinder should not rise above 150° or 160° Fahr. In order to do this the engine will require just about five gallons of water per horse-power hour to circulate through the water jacket: the water to have an initial temperature of 60° Fahr. A test was made on a 34 B. H. P. Fairbanks-Morse engine using "Puente" distillate, developing at the time of test 30.5 B. H. P.; 2¾ gallons water per minute were passing through the water jacket. The temperature before passing through the water jacket was 65° Fahr., after leaving the water jacket 172° Fahr.; the thermal units contained in this water is found by multiplying the weight by the rise in temperature, or $22.92 \times 107 = 2452\frac{1}{2}$ B. T. U. per minute passing away in the cooling water. If the cooling water is to be used over and over again, this heat must be dissipated by radiation from the sides of the water tanks. The usual rule for calculating the heat radiated by iron tanks containing hot water is, that 100 square feet of radiating surface gives off two heat units per minute for every degree of difference between the temperature of the tank and the temperature of the atmosphere. Then at a tank temperature of 172° Fahr. and an atmosphere of 60° Fahr., 100 square feet would give off 224 heat units: therefore to dissipate 2452 heat units will require 1100 square feet of surface. The writer has rarely seen this tank surface and where tanks are used and the engine doing steady work the engine has almost invariably too hot a water jacket. In the desert zone, where the temperature is for weeks at a time 115° to 120° in the shade, cooling tanks are of no use. There is too little radiation. In this case a portion of the water supply of the mill is run through the engine tank. (This water may be used afterwards in the battery as it does not come in contact with oil.) About 1000 gallons per shift was found to be about sufficient for an engine developing 30 H. P. It pays to keep the cylinder fairly cool as it affects an economy of fuel. When the cylinder is too hot the engine "kicks" or gives a disagreeable vibration before the compression stroke is completed.

IGNITION POINT OF EXPLOSIVE CHARGE.—To obtain the greatest commercial effect from the oil used the ignition point is set to occur just before the crank reaches the dead center at the compression stroke. It takes time for the petroleum gas to burn and in order to get the greatest explosive effect the gas should burn in a highly compressed air charge. The gas, commencing to burn before the piston has reached the dead center, develops its greatest power almost immediately after the piston commences its outward stroke and the gas is more completely burnt: effecting, as above pointed out, a great economy of oil. The ignition of the charge is effected by a Leclanche battery or small dynamo. The latter is by far the cheapest in running and gives a stronger spark than a battery. The hot tube is not often used, although most engines have one attached as a precaution. The dynamo should have a small battery auxiliary to use when starting up. The dynamo should give about five volts and six amperes.

GOVERNING.—In the petroleum engines used on the Pacific slope the governor is almost universally of the "hit and miss" class. That is, when the engine runs above speed the governor throws out the oil feed and the engine misses an explosion. When the engine has heavy flywheels the speed can be governed within 5% of the regular speed or even closer. Another form of governor sometimes seen is of the throttling order. This, however, while giving a very close regulation of speed, is not as economical as the hit and miss governor. For very close governing, as in electric light work, the throttling governor is to be preferred. For mine and mill work, where even a dynamo is driven, the hit and miss is preferable on account of its economy.

OIL PUMP.—Many failures are to be attributed to the oil pump: the pump requires careful attention. The valves and seats should be cleaned from time to time and the stuffing box through which the piston works should be well packed and the cup gland filled with oil. The suction pipe should be soldered together, placing no dependence upon the screwed couplings owing to the oil searching out the least defect. The end of the suction in the oil tank must be covered with fine wire gauze to prevent the least dirt passing through and checking the valves.

LUBRICATION.—It is stated from time to time that the petroleum engine requires little cylinder lubrication. This is not the case. For engines of equal power the petroleum engine uses three times the oil fed to the cylinder of the steam engine. Nothing but the special cylinder oil made for these engines should be used, if possible, in the cylinder. For the bearings, crosshead, etc., use a somewhat heavier oil than the cylinder oil, and feed plenty of it. The mere non-heating of the bearings is no criterion of the right oil feed. By using a liberal supply of oil the co-efficient of friction can be greatly reduced. The engine should be provided with oil guards, or casing, of sheet iron. To economize on lubricating oil do not stint the feed, but obtain an oil filter, of which there are numerous inexpensive kinds on the market.

FUEL.—Most of the petroleum engines in the Southwest use a product known as distillate in preference to gasoline, the former being not only cheaper but contains many more heat units than gasoline. It may be taken that 2 gallons Puente distillate (45°) is equal to 3 gallons ordinary stove gasoline. The distillate is not as volatile as gasoline and evaporation loss is not as great. Distillate is colorless, inodorous and has a specific gravity varying from 0.798 to 0.801. The consumption of fuel may be taken as $\frac{1}{12}$ to $\frac{1}{10}$ gallon distillate and $\frac{1}{8}$ to $\frac{1}{10}$ gallon gasoline per actual horse power hour. The thermal value of Puente distillate (45°) may be taken as 18,500 B. T. U. In comparing the fuel values of distillate and ordinary Western coal, the former being used in a petroleum engine and the latter in making steam for an ordinary small steam engine, using 6 pounds coal per horse power hour, we find that $\frac{1}{12}$ gallon (0.55 pound) distillate will do the work of 6 pounds coal; therefore 1 pound distillate is equal to 10.9 pounds coal, or 1 gallon distillate is equal to 72 pounds good Western coal. Distillate costing 16 cents per gallon is equivalent, therefore, to coal at $4.45 per ton, both delivered. Should distillate cost 20 cents per gallon, it would be equivalent to coal at $5.50 per ton or wood at $3.75 per cord, all delivered. The petroleum engine is, therefore, an inexpensive machine to operate.

EFFICIENCIES.—The working efficiency of the various American petroleum engines is very difficult to obtain. Our European friends seem to devote more attention to this very important subject. This is somewhat surprising in face of the fact that American manufacturers are far more liberal, as a rule, in giving information to the public than their foreign competitors. So far as the writer has been able to learn, the best reported test of a European petroleum engine gave an efficiency of 21%* of the total power contained in the fuel. The average engine gave about 16%. The writer made a test lasting for two months on a 34 H. P. engine made by Messrs. Fairbanks & Morse and operating a 10-stamp mill. The test was conducted in the following manner: (1) A series of tests were made to determine the actual power required by each portion of the mill; (2) a log was kept, giving the exact time each portion of the mill was in operation; (3) careful track was kept of the distillate used; (4) the temperature of the cooling water was noted at intervals. From this data the efficiency of the engine was determined. It is not claimed for these tests that the scrupulous care was observed such as is the case at exposition trials, but they will give the commercial result from which any accidental errors are reasonably eliminated. The following gives one day's results:

Water in cooling tank	1,800 gals. (15,000 lbs.)
Temperature at 7 A. M.	73° F.
Temperature at 6 P. M.	167° F.
Thermal units in water + 10% for loss	1,551,000 B. T. U.
Average power developed	29.6 B. H. P.
Distillate used (6.6 lbs. per gal.)	27¾ gals. (183.1 lbs.)
Thermal value of distillate	18,500 B. T. U.
Total heat used up	3,387,350 B. T. U.

Knowing that 1 H. P. should be developed (if there is no loss) by 2545 B. T. U. per hour, we can readily calculate the efficiency of the engine. Thus:

Heat lost in water cooling, per hour $\frac{1551000}{11}$	= 141,000 B.T.U.	= 45.78%
Heat used up in producing power, 29.6×2545	= 75,332 B.T.U.	= 24.47%
Heat lost in exhaust gases and friction	= 91,609 B.T.U.	= 29.75%
Total heat produced by combustion per hour	307,941 B.T.U.	100.00%

In this particular test we see that the efficiency of the petroleum engine in question was 24.47%. In the whole series of tests the lowest result was 22.6% and the highest 28 2%. The mean of the whole was 26.2%. This is a remarkable showing for this engine, and it would be interesting to have the efficiencies of other petroleum motors. A test on a small Foos engine of about 1894 make, and not in very good condition, gave to the writer an efficiency of 20.75%. It is not fair to compare these efficiencies on account of the disparity in size and condition.

WORKING CHARGES IN MILL.—By use of this motor in desert countries the working charges may be greatly reduced. It is conceivable that the charges may be brought nearly to a parity with more favored districts. The man in charge of the engine, having no boiler to fire and attend to, and having only to give a glance at the engine once in a while, is able to attend to the battery without neglecting either battery or engine. A man able to take care of an engine and the amalgamation, etc., in a battery is somewhat rare. In this case one of Mr. Harmon's dicta† is quite applicable—the mill superintendent should be able to make a "millman" out of raw material. Any number of good, smart engineers can be found who would be willing to learn how to run a stamp battery. A little extra pay is quite an inducement. Under these circumstances two men per shift can take care of a 10-stamp mill and not be too hard worked. A 10-stamp mill will require about fifty-five gallons distillate per twenty-four hours, which at 16 cents per gallon amounts to $8.80. This is by no means an exorbitant price to pay for power. Taking all expenses into consideration, there is no reason why the total milling costs should exceed 85 cents per ton even in a desert mill of ten heads.

PRACTICAL CONSIDERATIONS.—No mill engine of the petroleum type should be run continuously to its full rated capacity. It is not a safe motor under such conditions. The engines are guaranteed by the makers to have developed the power at which they are rated. To develop this power, however, the engine must make twelve explosions to twenty-four revolutions of the crank shaft. The engine can not work above this capacity, and, if a load is accidentally thrown on above it, it will simply stop. In this case the strains will be enormous and an accident is likely to occur.

Among men of long experience with petroleum engines it is generally believed that such engines should not be run continuously above five-sixths its rated power—say 25 H. P. on a 30 rated H. P. engine. When there is any doubt as to the load to be pulled

* The Diesel motor has given 35% efficiency and over.

†See article "Stamp Mill Practice," issue of Dec. 1, 1900.

by the engine, err on the side of safety. This engine is not like the steam engine; the only loss in underloading is the engine friction, and the fuel economy is not much less. Have a man around who knows something of these engines and don't give the engine absolutely into the charge of a roustabout. In selecting an engine, look to the simplicity of the design and to the quality of material and workmanship put into it rather than to the price. A cheap engine can be made by inferior material and workmanship being put into the machine. It may be the costliest in the end. Unless the purchaser is an expert in machinery and is able to judge of the merits of a new type of engine, he would do well to make his selection from one or other of the half dozen good standard makes, especially if he is not spending his own personal money. Insist on the man in charge of the engine keeping it clean and neat. If properly designed, altitude has but little effect upon the efficiency.

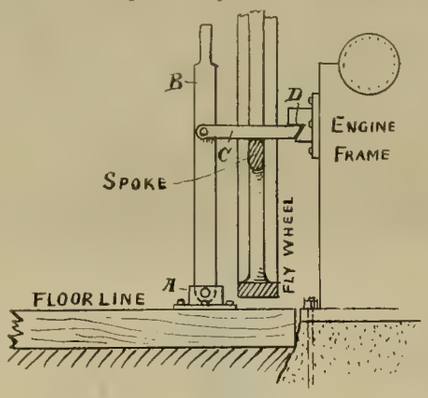
It should be remembered that an oil engine designed to develop a given power at sea level can not develop that same power at a higher altitude, nor in such a case can the same fuel efficiency be obtained. It is highly important in ordering an engine to specify the altitude at which the engine is to work, so that the manufacturers may be able to make the necessary adjustments called for by the altitude. Where an aneroid barometer is not available, the altitude can be determined by the boiling point of water thus: (1) When the boiling point is below 200° F., subtract the boiling point from 212 and multiply the remainder by 525. (2) When the boiling point is higher than 200° F., multiply the remainder by 500. This will give the altitude close enough for the engine makers. At 6000 feet elevation an oil engine of given size will develop only 90% and at 10,000 feet about 80% of the power it would develop at sea level. It will also consume from 10% to 20% more fuel per horse power hour. By speeding up the engine and cutting down the oil feed to suit each case, better results than these can be obtained. It is somewhat surprising that engine makers have not paid more attention to the design of high altitude engines.

PETROLEUM ENGINES IN MINING.—These engines are coming largely into use for hoisting and pumping. For prospecting work the hoist operated by these motors is of the greatest economy. Under such circumstances the work to be done is very intermittent; and when no work is to be done, the petroleum engine can be shut down, but is ready for work at a moment's notice again. A steam engine requires the fire to be banked, and, if a sudden call is made upon it, it can not respond till steam is raised. The economy of the petroleum hoist is very great. Where the work is of the usual prospecting kind, the hoist will not require more than three or four gallons distillate per shift, say 85 cents to $1 fuel and lubricant charges. It would be a wonderful steam hoist that could equal this. This hoist readily adapts itself to being operated from the collar of the shaft by rods leading back to the friction and brake gear. This is a great convenience when there is only one man on top, as he can quickly and readily attend to the dumping of the bucket.

There are two types of such hoists made—(1) the engine and drum are on the same bed plate; (2) the engine and hoist are separate and distinct. The writer prefers the latter type for two reasons: 1. The engine is more adaptable for other work, such as driving a fan, circular saw or pump. 2. The exigencies of the design in the first type of hoists call for a drum of small size. The advantages of an engine which is able to do such work as driving a fan, especially in a hot climate, for ventilation underground, is too obvious to require dilating upon. The second point, as to the size of the drum, is another matter. It is well known, of course, that a rope should not be passed over too small a drum or sheave wheel. On the combined hoist and engine the drum is rarely more than 24 inches diameter, using a ⅝-inch steel rope. According to the accepted formula, the strain due to bending caused in this case would be about 6800 pounds. The allowable strain in such a rope is 7800 pounds; it is obvious, therefore, that the allowable total load hoisted should not exceed 1000 pounds. The writer has used a hoist, where these conditions existed, where the load was frequently 1500 pounds, and after eighteen months the rope was apparently as good as new. One can frequently see in Arizona, and elsewhere, hoists working in this way. This naturally suggests the ideas: (1) Either the strains due to bending are exaggerated, or, (2) the rope is working under a dangerous strain. In regard to the latter idea, the writer has never heard of a rope breaking on these hoists, although such undoubtedly have occurred. In Arizona, where large numbers are used, one would expect to hear of such failures frequently, if the rope were under a dangerous strain; yet such is not the case. Still, it is disquieting to have a feeling of unsafety about a hoisting rope, and it is well to err always on the side of safety. It may be well, therefore, if the makers of such hoists would enlarge the size of the drum. This can be readily done when the engine and hoist are on separate bed plates, and for this reason the writer prefers them. Having had no experience with petroleum engines when operating air compressors, this use will not be considered.

A serious disadvantage of the oil engine is that it will not start under a load. By having the engine drive onto a friction-clutch pulley, this disadvantage can be obviated to a certain extent, for then the load can be thrown on after the engine has attained speed, doing this slowly, of course. By vigorous work, using the starting pump to its utmost, these engines will just start a 10-stamp mill if the stamps are hung up.

A useful little device may be described, which is of great help in starting a large oil engine, without men holding back the flywheel. A pair of angle brackets (A) of small size are secured to the floor, about 8 inches from the engine frame and about 2 feet from the cylinder end, according to size of engine. A lever of wood (B) about 1½″x2½″, is held between these brackets by a pin passing through. The lever can work freely in a direction at right angles to the engine. Near the top of the lever is an arm (C), about 10 inches long, held by a pin, so as to allow the arm to move vertically. The flywheel is moved over until



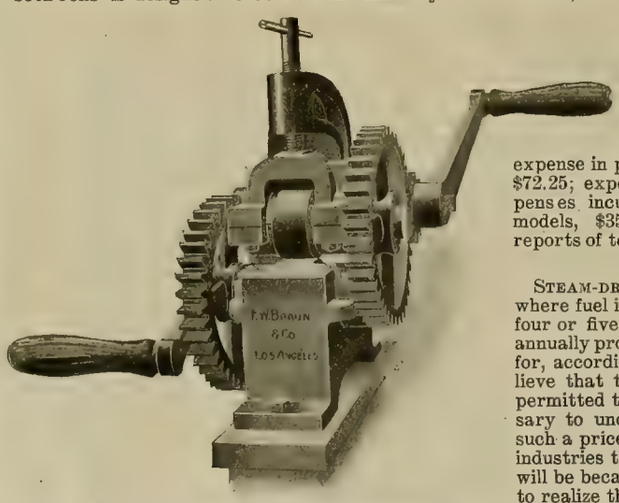
the crank is in position, ready to fire the starting charge. The arm of the lever is thrown over a spoke of the flywheel, so that the latter cannot move forward. Opposite the end of the arm is fitted a catch (D) to the engine frame by means of set screws; when the whole rig is in place the flywheel cannot move over. The starting charge is pumped into the cylinder; the lever is jerked out and the charge ignited simultaneously. The engine can thus be started by one man only. Of course, this device cannot well be used when the compression is obtained at starting by revolving the flywheel. It should have been noted that when distillate is used the engine must be started with gasoline, of which about one-half pint is required to start a 30 H. P. engine.

There is a great future for the petroleum engine, especially if means are successfully introduced to allow the use of heavier petroleum products than gasoline or distillate.

After 140 years of experimenting, the best steam engine can only give back 16% of the power locked up in the fuel. It is less than fifteen years since the petroleum engine has been in commercial use. The best modern engines of this type give over 25% efficiency. It has been stated that the Diesel motor has given an efficiency of over 35%. We may expect this type of engine to play an important part in the development of the arid zone, or wherever water and fuel are scarce. In Arizona and southern California these engines have already been of inestimable service.

Braun's Coronet Rolls.

Herewith is illustrated a new machine with novel features, especially designed for the use of assayers. A feed plate that is tangent to the contact point of both rolls is designed to obviate the difficulty of in-



serting a small bullion button between the rolls. This plate leads to the opening between the rolls; the button to be rolled is placed on the feed plate, and may then be easily pushed between the rolls with a pair of pincers. Opposite the feed plate, where the foil or coronet emerges, there is another plate that closely wipes the bottom roll and conducts the foil away from the rolls, preventing the coronet from dropping to the floor or becoming lost. The upper roll has a shallow groove cut longitudinally across its face, which, when brought to the point where it is contiguous to its fellow roll, insures positive feed of any bullion button inserted. Further information will be gladly accorded by the makers, F. W. Braun & Co., Los Angeles, Cal.

To Prevent Accidents.

In Leadville, Colo., is a new device at the Penrose shaft-house designed to prevent an accident common about mines, namely, the running of a cage or bucket through the sheave wheel, known as a safety detaching hook. The cable passes through an iron plate below the sheave wheel, and, if the cage ascends to this point, the upper clevis is detached by the severance of a copper rivet, iron flanges are released and hold the cage beneath the iron plate, while the upper clevis attached to the cable swings clear. Recently a practical test was given; the cage was sent up toward the roof of the shaft-house, with the possibility of an accident if the new apparatus did not work. The mechanism performed its work, the copper rivet was cut in two, releasing the cable and allowing the cage to hang suspended. A new rivet can be inserted and operations resumed in ten minutes after the cage is caught. There are about fifty of those safety hooks in successful operation throughout the State of Colorado.

Thirty Years Ago and Now.

A comparison has been made between the cost of mining in Georgetown, Colo., in 1870 and 1901 by the Courier. The figures are:

	1870.	1901.
Steel, per pound	$ 40	$ 10
Iron, per pound	25	05
Rope, per pound	60	12
Giant powder, per pound	1 00	15
Caps, per 100	3 00	60
Fuse, per 100 feet	3 00	50
Lumber, per M feet	60 00	20 00
Candles, per box	20 00	5 00
Nails, per keg	20 00	4 00
Coal oil, per gallon	3 00	25
Miners, per day	4 00	3 00
Freight rates	20 00	6 00

An Official Statement.

Relative to the legality of eight persons giving power of attorney to locate placer claims without number, thereby enabling a few persons to hold large areas of the public domain, it is well recognized that under existing mining laws claims may be located by agent; that one person may locate a claim not exceeding twenty acres, or eight persons may associate themselves in the location of one claim not to exceed 160 acres. There is no limit to the number of claims that any person or association of persons may locate.

BINGER HERMANN,
Commissioner General Land Office.

Washington, D. C., March 16, 1901.

GEO. W. SPROULE, Clerk of the U. S. Court in Montana, has his own opinions as to what are legal costs. In the case of the Colusa-Parrot Mining & Smelting Co. against the Anaconda Copper Mining Co., which was decided in favor of the latter, the original cost bill was for $275,749.73, but Mr. Sproule recommends that it be cut down to $317.70. He thinks the charges for expert testimony are excessive, and offers to pay R. W. Raymond, Clarence King, N. S. Shaler, and others, $1.50 per day, but no traveling expenses. He says: "There being no express provision of law, nor any course or practice of this court with reference to the following items contained in said cost bill, I will disallow the same, as follows: Assaying account, $4,789.50; services of experts in preparing for trial, $25,450; laboratory expenses, $1,583.58; expense in preparing photographs of mine workings, $72.25; expense of development work, $189,020; expenses incurred in the preparation of maps and models, $35,324.25; expenses incurred in securing reports of testimony, $3,156.02."

STEAM-DRIVEN factories cannot thrive in localities where fuel is dear. It does not seem as though the four or five million gallons of oil that California is annually producing will alter the situation materially, for, according to present indications, it is idle to believe that the price of oil to the consumer will be permitted to drop a single shade below that necessary to underbid the coal dealer. If it does fall to such a price as will enable California manufacturing industries to compete in the markets of the world, it will be because the oil magnates have been brought to realize the fact that their competitor in California is not high-priced coal, but electrically transmitted power. This is one service which a plentiful supply of energy from the mountain streams will, in all probability, render toward developing manufacturing in California.—The Journal of Electricity, Power and Gas.

Spitzkasten--Hydraulic Classifiers--Concentrators.

Recent mention of the German gold-milling system has elicited comment and inquiry concerning the details of the methods referred to, which, for purposes of individual comparison, are outlined herewith:

By reference to Fig. 1 it will be noticed that the apparatus consists of two sheet-iron prisms sitting one in another; the inner one can be moved by a hand screw as far apart from the outer one as desirable. Overhead runs a water pipe, from which connections are made to the bottom of the outer prism, pressing a stream of clean water upwards, designed to hold the floating slime particles in equilibrium, except sands and minerals heavier than the force of that pressure, they falling to the bottom of the spitzkasten and discharged through a spigot bent upwards to nearly the middle of the apparatus. The still suspended slime particles flow on into the second classifier, where the prisms are sitting farther apart, and are designed to lose here the next heaviest grains of ore, the process going on until all the coarser grains of the sands and heavier mineral particles are separated from the finer slimes. By the inner prism the operator is enabled to regulate the weight of the water column standing above the water pressure from below, in the effort to grade the different ore particles into their exact weight and size as they exist in the traveling ore pulp. The finest slimes flow into a spitzkasten which acts as a settling box, over which a horizontal current of water passes, out of which the suspended ore particles fall into the pointed, funnel-shaped bottom of each compartment, and are discharged through spigots in the same way upon the buddles as the coarser from the spitzlatten on the concentrators. These spitzkasten are of wood and may be given as many compartments as products are desired.

The water with the light, muddy slimes which overflows from the spitzkasten contains usually only such a small amount of the metallic components of the ore that they can be allowed to flow out of the mill, but should there be still an appreciable amount of gold or other valuable minerals suspended in it, then it is directed into settling pits and the settled fine sands and slimes treated on the buddles. With these classifiers are received graded products, i. e., coarser sands besides finer mineral particles whose physical conditions differ greatly, and when brought upon the tables are naturally, not only through their different specific weight, but also through their difference in volume, quickly separated. The stream of clean water which is used for washing on the vanners exerts one certain pressure; when that force is regulated so that it will act only on the specifically lighter but more voluminous, or more surface-offering gangue grains, cleaner concentrates and also cleaner tailings result.

The concentrator shown in Fig. 2 is an improvement on the "stein table," and a departure therefrom, designed to separate the gangue from the minerals quickly and cleanly as soon as they are brought on the table, and also separate the freed minerals from each other, as far as their specific gravity will permit. With ideal separation the quartz leaves the table as soon as it is fed from the board on the belt, occupying compartment four of a launder and box in blende, into compartment two; the third, the pyrites, go into compartment three; and the last in order, the galena, apartment four of a launder and box in front of the table. All these products are washed therein by jets of water from a pipe placed diagonally over the belt. This concentrator does not discharge at the ends, but sidewise, to which it can be inclined at any desired angle. The classified pulp is fed diagonally upon a rubber belt which travels against the feed of the ore and moves over two rollers situated on both ends, one of which furnishes the forward movement. This belt rests on a table in which grooves are cut and little streams of water forced through them, forming thereby a cushion which hinders wear and tear. This table rests in a stout iron frame which is suspended on two arms on an iron rod, allowing any desired inclination. It receives about 150 percussions per minute by a cam and spring, situated at the opposite ends of the machine, at the same time the belt travels nearly 2¾ inches per second. By these motions, it is claimed, the table is enabled to separate by specific gravity. The gangue with a certain amount of minerals is discharged on the lower, the mixed and heavier metals with a certain amount of the gangue are carried up to the higher end of the table or belt and there discharged. Should different minerals on the belt of the percussion table touch, or run together somewhat near the lines of their discharge, these are caught and kept for further treatment on the reserve tables. It is built of iron, with a capacity of about eight tons, if the ore is well classified.

The treatment of the fine slimes, so often considered superfluous, is an essential feature in the German system. The buddles shown are said to concentrate very close and tailings show hardly enough minerals to be worth rehandling.

From the time the slimes leave the mortars of the stamps they flow continually from apparatus to apparatus, as long as they do not form a ready product, even the clean sands from the vanners and buddles being washed through sluices outside of the mill. Only the separated metallic minerals and middlings are hauled and carried on a tramway to the store rooms or the middlings back to the machines. The muddy slimes which really constitute the tailings and come from the spitzkasten represent no larger volume than perhaps a quarter of a pound in a cubic yard of water.

In most cases the gold in the ores is associated—mechanically mixed—with the pyrites, seldom with the galena or blende, but, if so, then usually in juxtaposition with these minerals. For mines far from railroad communication, it is advantageous if they could send their concentrates free of gangue matter and any other volume and weight producing but unprofitable minerals, to the smelting works, or when they do not contain much copper, to the chemical works—a saving of expenses in haulage, in space, in time, fuel, chemicals, etc. It is of importance for mines with poor communication to market, to reduce the bulk of the ore to be shipped, by retaining only that containing the gold.

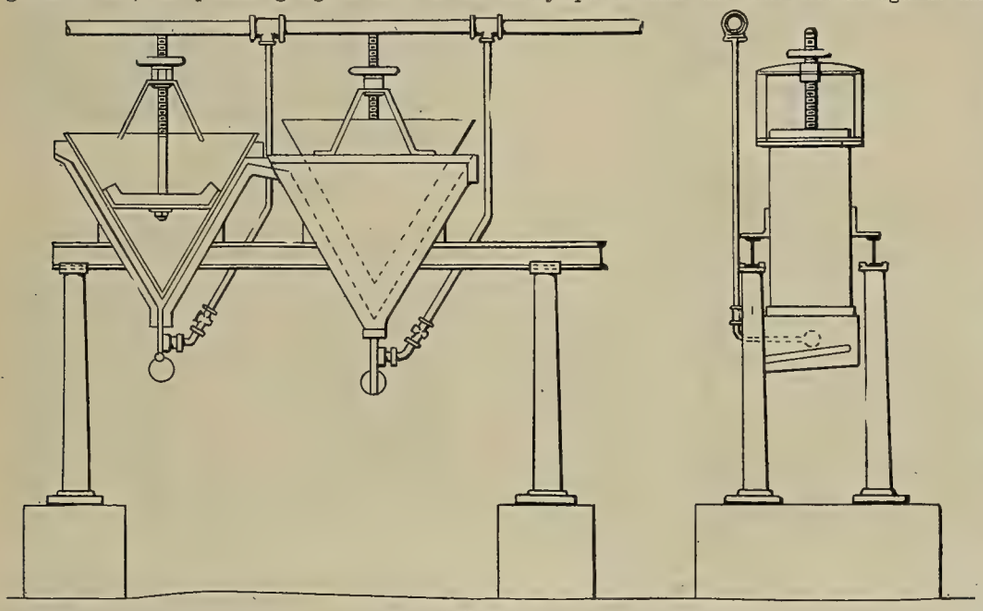


FIG. 1.

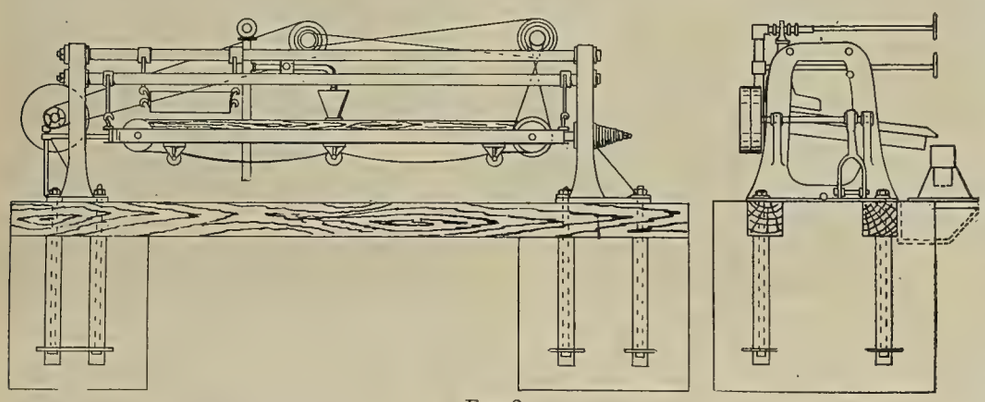


FIG. 2.

The Riecken Process for Treating Telluride and Sulphide Ores.*

This process is an electro-chemical system for the recovery of the precious metals from ores by a single operation, without resorting to filtration.

The machinery consists of an open iron tank with vertical ends, inclined sides and rounding bottom. The tank is provided with a horizontal shaft passing through stuffing boxes at each end of the tank, proper beaters to agitate the contents of the vat and suitable gear wheels outside the tank for rotation. The bottom and sides of the tank are lined with removable amalgamated copper plates and form the negative pole of the circuit, the positive poles being stationary. By means of a small force pump a stream of mercury is caused to flow continuously over these amalgamated plates, and which, running down to the bottom of the vat, is drawn off through a mercury trap, and again elevated by the pump, thus maintaining a continuous circulation. This keeps the negative plates bright and active, and is the essential condition which effects the precipitation of the gold in such a form that it cannot be scoured off by the attrition of the moving ore. By means of it the gold, whether in coarse particles or fine, is recovered in one operation, no filter presses are required, no precipitation by zinc is necessary, and the bullion commands a high price because of its purity.

The tank is partly filled with salt water, and, after starting the agitators, the ore to be treated is fed in a finely pulverized condition into the water until an easy flowing pulp is produced. From one to two pounds of potassium cyanide per ton of ore to be treated are now added, and a weak current of electricity passed through the tank, with the result that the gold which has been dissolved is deposited on the amalgamated plates as a dense amalgam, so hard as to quite resist the attrition of the coarser particles of ore. Any coarse gold under the brightening action of the current and of the cyanide will be mechanically amalgamated.

When the operation is finished the contents of the tank are allowed to flow to waste, or, if water is scarce, to settling tanks, when, after settling, the clear water may be pumped back into the apparatus for further use and the cycle repeated.

The apparatus now in successful operation at the South Kalgurli mine consists of two specially constructed vats of iron, lined with removable copper sheets, which render them rigid, riveted to ¼ inch plates. These two tanks are 12x8 feet wide at the top and 11 feet deep, capable of treating jointly sixty tons per day. Not over 3 H. P. will be required to agitate the ore and produce the current for each 15-ton vat.

The operation of the plant being conducted automatically, less labor will be required than is necessary in the ordinary cyanide process, and the ore being handled as a sludge, there is no hand labor in filling and discharging vats; a solution containing .05% of cyanide is sufficient with most ores to run the tailings down to below 1 dwt.

The loss of floured mercury will not excced two ounces per ton of ore treated.

ESTIMATE OF COST.

Cyanide, 2 lbs, at 1s 2d per lb	2s 4d
Mercury	0s 3d
Power, ½ H. P., coal at £2 per ton	0s 6d
Labor	2s 0d
Water, 200 gallons (recoverable)	1s 0d
Labor and stores for engine and dynamo	0s 6d
Cost per ton treated	6s 7d

To this must be added the cost of the necessary mechanical preparation of the ore, viz., crushing, and, when treating tellurides and sulphides, the cost of roasting. Both operations, if properly conducted, ought not to exceed 7s 6d per ton. To this add 1s for repairs, etc., and the total per ton treated amounts to from 14s to 16s.

The Riecken process consists merely in agitating

*Condensed from article by H. R. Cassel, in London Mining Journal.

the prepared product in the tanks with dilute cyanide solution, and conducting through the vat a current of electricity, the coarse and fine gold being precipitated as an amalgam which can be retorted into a marketable form with a minimum of expense and loss.

Estimate of cost for labor and fuel, including chemicals, electric current, etc., for treating 100 tons per day in Western Australia, the ore being handled automatically:

	Per week.
3 engineers, 1 each shift, at £4	£12 0s
3 firemen, 1 each shift, at £3 10s	10 10s
3 roaster furnace men, 1 each shift, at £4	12 0s
1 blacksmith, at £4	4 0s
1 carpenter, at £4	4 0s
36 men, 12 each shift, at £3	108 0s
1 mill superintendent, at £5	5 0s
1 chemist, at £8	8 0s
1 assistant chemist, at £5	5 0s
1 helper, at £3	3 0s
1 clerk, at £3 10s	3 10s
Total per week	£175 10s
Or per day	£25 0s

FUEL PER DAY.

For roasting and drying 8 tons of coal, at £2 5s	£18 0s
130 H. P. 4 tons of coal, at £2 5s	9 0s

CHEMICALS.

200 pounds of cyanide, say	£15 0s
100 pounds of mercury, say, lost	12 0s
Other chemicals, fluxes, etc	1 8s
Total	£80 8s
Add for repairs, incidentals, etc., £2555 per annum, or per day	7 0s
Total cost for 100 tons per day	£87 8s

Should oxidized slimes only require treatment by this process, the cost for treating them would amount to about 6s 8d per ton.

Parting Assays.

When necessary to determine the amount of gold or silver contained in a given alloy, and the amount of each of these metals present in the same sample, such determination is termed "parting assays." If the quantity of silver in the alloy be more than three times that of gold, the separation may be effected by nitric acid, but the gold will be left in a state of powder. It may, however, be washed, ignited and weighed. Should the amount of silver be small compared with the gold, and the assayer wish to avoid the trouble of inquartation—that is, the adding of the requisite proportion of silver—the alloy may at once be subjected to the action of aqua regia, when the gold will be dissolved, and the silver thrown down as an insoluble chloride. The clear solution containing the gold is then decanted, and when the excess of acid has been expelled by evaporation, the gold can be precipitated by sulphate of iron. The determination of the amount of silver contained in gold by dry assay is a complex operation. One or two gold assays in the ordinary way are made, and at the same time two more assay pieces are passed through the furnace, but without the addition of silver. By this means all the oxidizable metals are in both cases removed, and the difference in weight between one of the cornets resulting from the ordinary assay, and the button of mixed gold and silver as drawn direct from the furnace, must be due to silver originally present in the alloy.

The silver contained in the solution of its nitrate resulting from the common process of parting may readily be recovered by adding an excess of chloride of sodium, which will throw down the whole of the silver as white insoluble chloride. This precipitate, which speedily becomes slate colored on exposure to light, is collected and put into a vessel containing water acidulated with hydrochloric acid, some zinc or iron is introduced, and the silver is rapidly restored to its metallic state, in the form of a dark gray powder. The supernatant liquid having been decanted, this fine metal is washed with dilute hydrochloric or sulphuric acid, in order to remove traces of iron or zinc; but as the removal of the former of these metals may be effected more perfectly, it is used in preference to the latter. After washing and drying, the silver is fused in a crucible with the addition of a little carbonate of soda or niter, and cast into bars.

The alloys of gold and copper are cupelled like the alloys of gold and silver; but as copper has great affinity for gold, it is necessary to use a larger proportion of lead to insure its oxidation when combined with gold than when united with silver, this proportion varying according to the standard and the temperature. For the same standard there must, under similar circumstances, be twice as much lead used in the cupellation of gold as in that of silver. Thus fourteen parts at least ought to be employed in common furnaces for an assay of gold coin which contains 0.100 of copper. There is no inconvenience in employing a little more, as it does not increase the loss of gold. However great the proportion of lead may be that is added to the cupreous gold for the purpose of cupellation, the button always retains a very small quantity of copper, of which a fresh cupellation does not free the gold, and which occasions what is termed the surcharge. This surcharge being very slight, it can be neglected in assays of minerals, but it is necessary to take notice of it in the assays of alloys. But it is known that the presence of silver much facilitates the separation of copper from gold, and it is rare that an alloy of cupreous gold does not contain a little silver, which must be separated; and when this is not the case a small quantity of that metal can be introduced into the alloy, so as to be in about the proportion of two and one-half parts to one of gold. When an assay is to be of an alloy of gold and copper, a sufficient quantity of silver should be added to fulfil the condition according to the presumed standard, which is approximately determined by a preliminary assay, and then cupelled with lead.

PROPORTION OF LEAD TO BE EMPLOYED IN THE CUPELLATION OF GOLD AND COPPER.

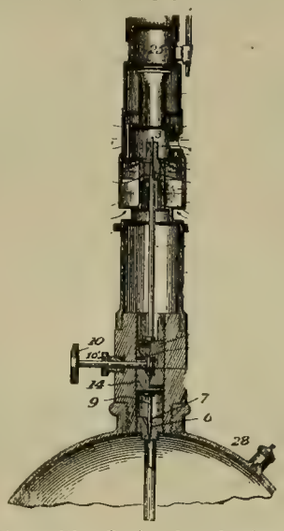
Gold in alloy.	Lead required.
1000 thousandths	1 part.
900 "	10 parts.
800 "	16 "
700 "	22 "
600 "	24 "
500 "	26 "
400 " or less	34 "

Mining and Metallurgical Patents.

Patents Issued March 19, 1901.

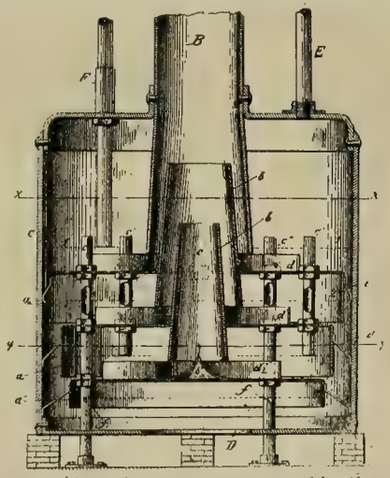
Specially Prepared for the MINING AND SCIENTIFIC PRESS.

APPARATUS FOR THE PRODUCTION OF VAPOR FROM OILS.—No. 669,987; A. Hays, Salt Lake City, Utah.



Combination with oil chamber having valve-controlled outlet, mixing tube arranged in line with outlet, means for admitting air to interior of mixing tube, outer tube surrounding mixing tube extending above and below ends, downtake passage between two tubes for delivering gas into space below lower end of mixing tube to maintain flame therein; means for causing upward current of air into space below lower end of mixing tube to force flame into mixing tube about outlet, and obstruction to free passage of gas above mixing tube.

HYDRAULIC AIR-COMPRESSING APPARATUS.—No. 669,995; W. J. Linton, Woodstock, Canada.

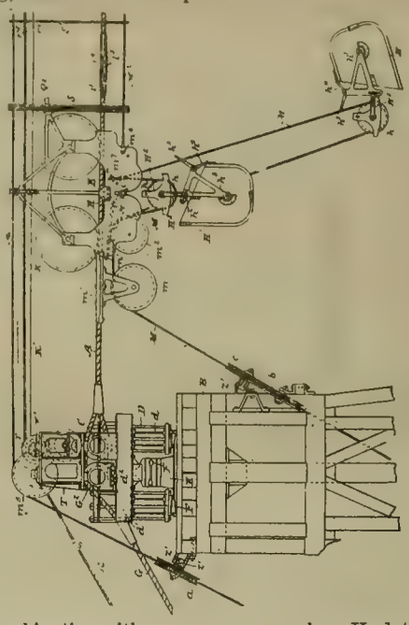


In hydraulic air compressor combination with stand pipe B and separating chamber C, of separating chamber, a, provided with water conductor pipe b, one or more suitable air outlets; air pipe E, separating chamber a″ provided with one or more outlets, c″, openings into which are below lower surface of roof of separating chamber a″.

PROCESS OF TREATING SULPHUROUS ARSENIC ORES.—No. 670,140; E. Petersson, Brussels, Belgium.

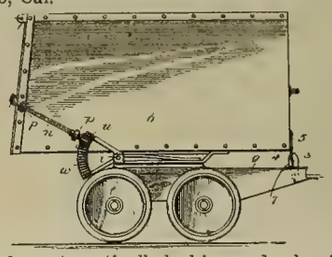
Pulverizing ore, in mixing same with carbon likewise pulverized, in heating mixture in retort or muffle to which all inlet of air or other gas is precluded, in continuing heating until arsenic in mixture has been driven off from ore as sulphide without material reduction and expelled from retort.

CONVEYOR.—No. 670,155; A. D. Jansen, Johannesburg, South African Republic.



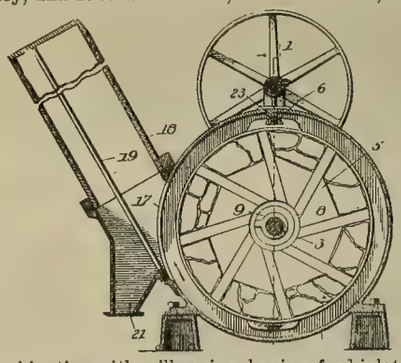
Combination with conveyor car, such as H, detachable bucket, such as H′, locking device consisting of movable forked bolt, such as K, pivoted to body of car, adapted to receive within its forked end studs h h formed on framework which carries bucket, locking bolt K being retained in position by second locking bolt, such as L, and tension spring l^2, which prevents forked bolt K dropping by reason of weight of bucket attachment which it continues to bear until second retaining bolt L is knocked out of position by engaging projection or catch l^3 clamped to main ropeway.

ORE CAR.—No. 670,092; G. E. Woodbury, San Francisco, Cal.



Device for automatically locking and releasing door of tilting ore or coal car from movement of car body on truck, combination of rotatable shaft mounted on car body, locking cam fast on shaft adapted by its rotation to engage and disengage door, rack stationary on truck, gear fast on shaft engaging rack to rotate shaft by rolling contact with rack.

GRINDING MILL.—No. 670,116; T. L. Sturtevant, Quincy, and T. J. Sturtevant, Newton Center, Mass.



Combination with mill casing having feed inlet and discharge opening, of fixed bed stone mounted in casing in vertical position, horizontal shaft, vertically placed runner stone carried by shaft co-operating with bed stone, screen box or casing outside mill casing, chamber of which communicates with chamber of mill casing through discharge opening, screen box having closed upper end, closed upper side against which latter reduced material projected into chamber of screen box by rotating parts of mill is mainly thrown, inclined screen in screen box which finally receives reduced material projected into chamber box, inclined screen located at distance from and thus independent of feed inlet to mill casing so that it is not subjected to wear by incoming coarse or unreduced material.

MINING SUMMARY.

Specially compiled and reported for the MINING AND SCIENTIFIC PRESS.

ARIZONA.

COCHISE COUNTY.

Near Fairbanks the Arizona Concentrating Co. of Phœnix is operating on the tailing dump at the old Grand Central mill, which ran ten years ago on Tombstone ores. Their method is to sluice the material down into a clarifier, then pass it over canvas tables having numerous small nails, which act as riffles. They run about fifty tons per day, the saving being in silver and lead.

Fairbanks, March 18.

The Calumet & Arizona M. Co., made up of Calumet & Hecla and Pittsburg iron people, have a group of eleven patented claims which join the Copper Queen group on the southwest. Present development consists of a shaft 850 feet deep, with about 2000 feet of drifting and other work on the 750 and 850-foot levels. Incidental to this development about 2000 tons of oxidized ore have been hoisted that runs an average of 7% copper, with small values in gold and silver. The ore body has a north-south trend, following the course of a porphyry dike. It has a dip to the south along the bedding planes of the porphyry. The ore shoots lie off the porphyry dike in a dolomite lime formation. The intention is to sink to 1000 feet within the next month or two. In the adjoining Copper Queen grounds the workings have reached the sulphides, and the Calumet Co. expect to reach the same character of ores, but at greater depth than that at which they were found in the Copper Queen. Supt. I. L. Merrill states that the company will undoubtedly erect a smelting plant this season. The underground work is in charge of Foreman E. McFarland. The stock is being floated in Boston at $10 per share.

The Cochise Copper Co.'s group of fifteen claims lies southeast from the Copper Queen, on the north side of the gulch. Development is in progress, the main shaft being 325 feet deep. It is expected to reach the ore body at 600 or 700 feet depth.

Bisbee, March 19.

The Mammoth mines, Johnsville district, 20 miles west of Willcox, are reported sold for $200,000 to Eastern parties.

COCONINO COUNTY.

C. H. McClure of the Eastern Star mine says that a large body of smelting ore has been uncovered.

GILA COUNTY.

A. P. Campbelle, in charge of the Howle group of copper mines, near Globe, is preparing for development work. A 500-foot tunnel will be started at the base of the hill on the Wetumpka claims, to cut the main ledge.

MARICOPA COUNTY.

Four miles from Wickenburg, the Oro Grande is reported to have unusually rich gold ore.

The Phœnix Reduction Co. has been organized to build a new smelting plant at Phœnix to smelt ores with crude oil instead of coke.

PINAL COUNTY.

The Ray mine is well developed, uncovering a ledge of quartz-porphyry, rich in copper glance, the concentrates running 30% to 40% copper. The property includes a large concentrating mill. The chief difficulty which resulted in the property closing down a short time ago appears to have been a lack of satisfactory power to operate the mill. The Ray is 45 miles northeast of Red Rock, on the S. P.

SANTA CRUZ COUNTY.

The Mowry mine, which belongs to A. Steinfeld of Tucson, was located and opened by Lieut. Mowry in 1857. Its location is about half way between Harshaw and Washington camp, 12 miles from Patagonia. A 300-foot shaft sinks on the vein foot wall, from which drifts are run at the first, second and third stations. The vein matter is a contact between granite and lime and runs 100 feet wide in places. The ledge has an east-west trend and has a dip of about 45°. The ores are a clean lead-iron carbonate, carrying good values in lead and silver. It contains no zinc nor copper and only a small percentage of silica, hence makes a very clean concentrate. The iron is in excess of the silica, and the premium on the former overbalances at the smelter the penalty on the silica and the treatment charges. F. E. Willson, formerly at Keswick, Cal., is Supt.

The Hardshell mine, which belongs to the Patagonia M. Co., is located near Harshaw, 9 miles from Patagonia. R. R. Richardson is one of the principal stockholders, J. C. Smith being superintendent and J. M. Bandarraga foreman. The mine is opened through a 400-foot incline shaft, which follows the foot wall, cutting under the ore body. Drifting and stoping have been extensively done on the 100, 250 and 300 foot levels, and the immense chambers that have been cut out in various places show the ore to exist in large bodies in an irregular formation. The appearance of the dump shows that only a small amount of waste has been taken out. The vein matter is pretty thoroughly oxidized and decomposed, the values comprising a lead carbonate and silver. Here and there, however, there are streaks of hard quartz and bunches of galena. About forty-five tons of ore per day are mined and milled, the mill being equipped with crusher, rolls, revolving screens, hydraulic mixer, elevator and concentrating tables. About ten tons a day of concentrates result. The mill tailings are being impounded, and it is the intention to cyanide them. It is presumed that about 10,000 tons have accumulated.

Wm. T. Powers is developing a group of claims in the Santa Ritas, 12 miles west of Patagonia. The work he has done discloses a ledge of lead and copper sulphide, assays from which ran $8 gold, 24 ounces silver, 10% copper and 20% lead. His work consists of a 170-foot tunnel, which crosscuts to the vein at 160 feet depth, and there is some drifting. He has six claims extending along the strike of the ledge.

Patagonia, March 20.

The Pride of the West property is at Washington camp, 20 miles southeast of Patagonia station. It is about the same distance from Nogales. The property comprises the mines, which produce a lead, copper, zinc and iron ore; a mill equipped with crushers, rolls, roasters and concentrators, and a matte smelter of one reverberatory furnace. The ore, after being crushed to 8-mesh, passes through cylindrical revolving roasters, thence through Wetherill magnetic separators, of which there are two. These magnetic machines make a separation of the copper material from the zinc-lead quartz. The copper consistency is conveyed to the reverberatory smelter, in an adjacent building, from which a 50% matte is produced. The zinc-lead material, or tailings, from the magnets passes to Wilfley concentrators, the product being a lead concentrate that is shipped to a lead smelter. The production amounts to about five tons of copper matte per day and three tons of concentrates. By a system of steam condensation the use of water is greatly economized. Only about 6000 gallons of water per day is used by boilers and concentrators. The mine is developed through tunnels and winzes, the ore being trammed from mine to mill in cars. The property belongs to Colorado parties, Messrs. Wilfley, Gee, Smith and others being interested.

In the same locality is the Duquesne group, which is in control of the Westinghouse interests. It comprises large surface holdings, with quite extensive underground development, whereby large bodies of iron, zinc, copper and lead sulphides are disclosed. The property has not operated for some time, though 200 tons of ore were recently shipped to Pittsburg for testing. A smelter is projected, with the view of operating the property on a large scale. The ores here are low grade, but in large bodies, copper being the preponderating value. The property is well equipped with hoisting and compressor machinery and good buildings.

Washington, March 27.

CALIFORNIA.

ALAMEDA COUNTY.

Seven miles from Livermore the Fifteen-Three Oil Co. is drilling for oil; the hole is now 560 feet deep. The formation is blue sandstone.

ALPINE COUNTY.

Ten feet solid snow is reported at Blue Lakes.

AMADOR COUNTY.

At the Free American mine, 6 miles east of Sutter Creek, W. Dennis is sinking the Tucker shaft to drain the other two.

Supt. J. R. Tregloan is taking out ore from different levels of the South Spring Hill mine at Amador City.

The Argonaut mill is idle; the mine is kept open and prospecting work is being done.

At the Centennial mine, near Drytown, Supt. Gross is doing development work.

At the Keystone mine, Amador City, the 40-stamp mill is running; the new shaft is being sunk.

The Mutual mine, near Sutter Creek, is to resume.

The shaft of the Gover mine is now unwatered to a depth of 600 feet.

The Prince mine, near Plymouth, is bonded to San Francisco men.——The Kirkwood shaft is being sunk 80 feet per month.

Supt. W. A. Prichard of the Keystone mine, Amador City, is figuring on a new 60-stamp mill.

CALAVERAS COUNTY.

A strike is reported at the J. J. Brown property near Campo Seco.

An additional 100 feet will be sunk in the Birdena mine at Campo Seco.

The dam for the Alta mine, at Copperopolis, is finished.

The Ilex mine at Rich gulch is being reopened. J. O. Stewart has charge.

T. F. McArdle has sold to J. Shearer of San Francisco the Soldier Gulch quartz mine for $13,000 cash. The property is 1 mile south of Robinson's Ferry, on the Stanislaus river.

E. K. Stevenot has charge of the operations of the Baltimore Mining & Developing Co., and will do considerable active development near Chaparral Hill, Carson district, this season.

EL DORADO COUNTY.

Near El Dorado the Shaw mill is in constant operation. The Union shaft is now unwatered.

The River Hill Co. has holdings at Poverty Point, 1½ miles north of Placerville, where a three-compartment shaft is sinking to tap a ledge east of it at a depth of 1000 feet. One hundred and fifty feet from the shaft will be built a 20-stamp mill; consulting engineer for mill work, E. H. Benjamin. Four thousand feet of pipe is being laid. Thomas Clark is superintendent.

KERN COUNTY.

Near Bakersfield, Eaton & Bell have sold to the Pacific Petroleum Co., Ltd., the Edith B. and Cupper Creek mining claims, with the understanding that the petroleum company commence work within ninety days drilling a well until oil is found, or until a depth of at least 1000 feet has been reached.

The Yellow Aster at Randsburg will be sunk to the 1200-foot level.

In Kern River district there are now 241 producing oil wells, each sending out from 25 to 500 barrels per day. These wells are from 600 to 1400 feet deep. The oil feed is about 700 feet above sea level. The oil is delivered in San Francisco for 80 cents per barrel; freight 42 cents per barrel, in tank cars, each carrying 155 barrels. Lack of cars keeps down production: a pipe line, westward to the coast or northward to San Francisco, is projected. At the wells the oil sells for from 25 to 40 cents per barrel. Its present use is almost entirely for fuel purposes. The S. P. R. R. Co., and San Francisco and Stockton manufacturers are among the largest consumers.

The Kern River Oil Co. is reported to have sold 20,000 barrels of oil to the Standard Oil Co. at 25 cents per barrel.

LOS ANGELES COUNTY.

Oil is 85 cents per barrel on the cars at Los Angeles; at the wells from 70 to 80 cents. The output is undiminished.

The Central Oil Co., Whittier, has 11,000 barrels of oil stored, and is adding to the supply. The Standard Crude, Whittier, is 830 feet down.

MARIPOSA COUNTY.

Work on the Nameless mine, in Whites Gulch, has been discontinued. The parties operating this property had it under bond for $10,000; the bond expired last week. The company desired an extension of the bond, but the owners would not consent, so operations have stopped.

MONO COUNTY.

In the Standard Con. mine at Bodie for the week ending March 16th 337 tons of ore were crushed; average assay vanner tailings, $7.79; concentrates produced, 76 tons; assay value, $82; amalgam produced, 1058 troy ounces; value per ounce, $2.05.

MONTEREY COUNTY.

A "gusher" is reported struck on the Tomboy claim, San Ardo, 65 miles southwest of Salinas, at a depth of 1140 feet. There are five companies operating in that vicinity.

NEVADA COUNTY.

The Niagara mine has a ledge 2½ feet in width showing free gold. A 5-stamp mill will soon be started.

The Jackson copper mine at Spenceville is bonded to Eastern men.

Supt. P. Tautphaus has fine ore in the Providence mine, on the 1800-foot level; the ledge is 6 feet wide.

The Nevada County mine, on Deer creek, is bonded for $10,000 to Whilden, Marvorich, Calahan, Rood and Hawkey. Machinery will be placed on the mine and the property drained.

PLACER COUNTY.

A new 10-stamp mill will be put in by the Washington Quartz M. Co. at Bath.——H. F. Calenberg has sixteen men working at the Jupiter gravel mine.

PLUMAS COUNTY.

At Genesee, S. E. Swearingen has men employed in the Reward mine sinking on the copper ledge.

At Laporte, G. F. Mahon, Supt. Dutch mine, has water to the mine and is piping gravel.——Packer & Son, owners Alturas mine, on Slate creek, are working several men.——The Thistle is piping the tailings.

RIVERSIDE COUNTY.

Perris reports that the Santa Rosa gold mine has been sold to Denver and Los Angeles men, who will unwater the property.

At the Red Cloud mine, 30 miles from Salton, fifty men are employed; a 100-ton smelter has been erected. In the same district two 10-stamp mills have been completed.

SAN BENITO COUNTY.

Cinnabar is found near the New Idria. J. C. Christenson says the ledge occurs between walls of sandstone and serpentine, with a gangue of black alta. The find is 3 miles from Tres Pinos.

A depth of 930 feet has been reached by the San Benito County Oil Co. The drill is going through blue shale.——The rig of the Grant Oil Co. on the Topo has been turned over to the company by the contractor. Drilling will begin at once.——The San Carlos Jr. Oil Co. will begin operations on its property as soon as teams can get their material on the ground.——There are forty-seven oil rigs in operation in San Benito county.——The Fresno-San Benito Oil Co. has shut down owing to an injunction granted to a scripper. The company will put up bonds and go on drilling.——A. Leonard has bonded the Aurora & Mollie O group of quicksilver mines, near Hollister, to G. Senn of San Francisco for $22,000.

SAN FRANCISCO COUNTY.

The California Petroleum Miners' Association, discussing freight rates, say:

We who are at present producing oil in the Sunset, McKittrick, Coalinga and Kern River districts would certainly feel injured if new oil discoveries were made say, for instance, in the neighborhood of Mount Diablo, and the producers be enabled to railroad their oil into San Francisco at such rates, based on distance, as would shut out oil in the districts named. If the rate is uniform, no new discovery, no matter how near the point of consumption, could bar the oil in localities more remote. The actual cost of transportation of a car carrying from 150 to 175 barrels of oil is, when loaded, 3 cents per mile per car. In view of the fact that the grade from our California oil fields to San Francisco is down grade it is reasonable to suppose that the cost here is less than the 3 cents per mile above mentioned. But taking that as the actual cost to the railroad companies, then the cost of transporting a car of oil from Bakersfield to San Francisco, a distance of 312 miles, would be $9.36; and allowing the same rate in returning the empty car the total cost would be, from point of shipment to destination and return, $18.72, whereas the charges now are from $63 to $73.50 per car, according to the number of barrels carried. When oil was first discovered it was selling at $2.50 per barrel, and the freight charge was from 62 cents to 65 cents, about 25% of the selling price of the oil. When the price of oil fell to $2 and $2.10 per barrel, the railroad of its own accord reduced the transportation charges to 52 cents per barrel. When the price of oil was reduced to $1.60 or $1.70 per barrel, the transportation rate went to 42 cents per barrel, at which it has since been maintained, notwithstanding the price of oil has greatly fallen. It will be seen that the railroad charges have been always in the neighborhood 25% of the selling price of the oil, and the present rate should be reduced accordingly.

SANTA CLARA COUNTY.

Oil development work near Gilroy is active. There are twelve derricks in operation.

SHASTA COUNTY.

The Harrison copper claims on Upper Cow creek are reported bonded to J. W. Turner of Eureka for $45,000 till November 10, 1901.

At Jersey City, N. J., the Ruby Hill Copper M. & S. Co. has incorporated with a capital of $2,500,000; incorporators—W. W. Cromwell, W. J. Curtis, H. B. Parsons, G. H. Sullivan, H. W. Clark. It is locally stated to have acquired a copper mining property at Copper City said to be partially developed; J. R. DeLamar is reported to be the principal promoter.

The London Tunnel Co.'s group of seven claims on Mule mountain has been bonded by F. M. Archer for $40,000.

SIERRA COUNTY.

A carload of pipe and a carload of steel shoes and dies have arrived at the Gold Bluff mine, Downieville; W. H. Copeland, Supt.

At the Four Hills mine thirty-five men are laid off while the shaft is being deepened.

SISKIYOU COUNTY.

The pocket found by S. Schlski, Graham gulch, near Cecilville, is said to be unusual. He took out $15,000 and then

ld Orcutt Bros. of Yocumville that he ad all he desired and gave them the location of the pocket. Since Schlski gave it them, they have taken out about $4000 nd have not gotten to the bottom of it et. Schlski bought this claim from Mcinnis Bros. for $10. They had taken out pocket of a few hundred dollars within feet from the pocket found by Schlski. wo pocket prospectors ran the trace up the pocket a few days before Schlski ent to work on it; but as they could only t a few small colors to the pan, they ncluded that it was not worth their me to dig on the seam. Before Schlski ad gone down 3 feet he had a seam of arly pure gold 5 feet long.

The copper mine on Moffitt creek, near ort Jones, formerly owned by Loftus cos., is being operated by T. J. Henrson.

Cherry Creek is a lively mining locality, the placer and hydraulic claims being orked with full force, also the Cherry ll quartz mill and mine.

The Siskiyou Hydraulic M. Co., at Calhans, B. Boyer, manager, has nearly 100 en employed on preparatory work for o large hydraulic plants—one on South rk and the other at Wild Cat. They ve one claim in operation under the anagement of J. O. Rusby.

The Consolidated M. & D. Co. has ught up river bottom land near South rk and are working two claims by draulic process; they will build a edger.

E. H. Wallace will shortly resume work the Phillips & Cartwright mine at lumbug.——At the Bull hydraulic mine, ove the forks of the Humbug, hydraulking has begun.——The 10-stamp mill the Dewey mine, in Gazelle district, is nning steadily.

TUOLUMNE COUNTY.

The new 5-stamp mill at the Prudlomme mine, near Carters, is in operaon.

At the Santa Ysabel mine prospecting d new development work begins in aft No. 3. Two thousand feet of air pe are laid, connecting the compressors h the shaft, to convey power for operng the drills. An electric hoist is at mine.

The Republic mine, near Carters, is sold f $15,000.

n the new chlorination plant at the Sawmut mine the furnace uses oil for l.——A new 10-stamp mill is going in at Densmore mine.——At the Mt. Lily ne the 5-stamp mill is in constant operan.

The Arbona mine, near Sonora, is to e air compressors and power drills; dits will be started north and south; the in shaft is down 612 feet.

YUBA COUNTY.

uit has been filed in the U. S. Circuit Cart for condemnation of lands in this cnty to be used as the sites of impoundin barriers. One of the terms by which tl Federal authorities have taken hold o he matter is that the dam sites and sling reservoirs shall be in the name of th United States Government, and it is tonect this condition that the suit has bn instituted.

COLORADO.

tate Senator S. I. Hallett of Pitkin cnty, and others, succeeded in preventin in the Legislature last week a wholesa taxation of mine products, the revenu bill, as passed, taxing one-fourth of th output.

ARAPAHOE COUNTY.

. Warne has brought suit against Wichester & Stevenson, the Doctor and Chf M., M. & L. Co., A. E. Carleton, et al for $125,230, which he claims as his shre of the Doctor mine of Cripple Creek, bsd on an allegation that J. Winchester, th discoverer of the mine, was grubstd by the plaintiff, and that, acting in su capacity, he expended $6500, and was prnised an undivided half interest in an mining property that the defendant Wchester secured.

BOULDER COUNTY.

Eldora the Enterprise mine has been lesd to Mrs. E. Richardson of Denver fo 50,000.

Boulder the first payment of $2000 is mse by the Golden Age M. Co. to T. Mgersdorf for a group of claims in the Sur Loaf district, bought for $16,000. Th property will be worked under the dirtion of J. S. Krum. The company ow the Tenderfoot, near Sunshine.

e El Moro group of mines at Jamesto is reported sold for $14,000 to E. of Boulder.

e Creston Golden Eagle M. Co. ed the Golden Eagle mine at Salina is doing development work. Man- Fitzgerald hopes to see the mine on a dividend paying basis.

CHAFFEE COUNTY.

l the Twin Lakes district the Simons grop, on Miner hill, is sold for $24,000 to L. M. Turner of San Francisco. Mr. Turner expects to put a road to the mine and begin systematic development.

CLEAR CREEK COUNTY.

Twenty-four patented lode claims in Cascade mining district have been sold to the Victor Con. G. M. & Tunnel Co., composed of Denver and Boston men; E. C. Gard of Denver is president. The properties comprise a compact body of gold-silver lodes. A double-track tunnel will be driven 2000 feet to cut these properties at great depth.

Interests in placer ground properties from Idaho Springs to Floyd hill, 8 miles, are consolidated in one large company. A 7000 H. P. plant is projected on Gold Bar, near Floyd hill.

EAGLE COUNTY.

The Eagle Bird T. & M. Co. is incorporated; capital stock, $100,000; W. S. Cheesman of Denver, president.

FREMONT COUNTY.

At Florence a strike was threatened at the plant of the Rocky Mountain smelter. A committee from the local Smeltermen's Union presented a new scale to Manager Danforth. The demand for an increase in wages in the different departments ranges from 20% to 50% more than paid at the Pueblo and Canyon City smelters. The manager said he could not pay any greater wages and earn enough to pay expenses.

The coal miners at Rockvale have called off the strike on the property of the Colorado Fuel & Iron Co., which had been on the last ten weeks. The company granted concessions to the miners, who will receive 75 cents a ton of 2000 pounds the run of the mine; formerly they received $1 a ton for lump coal only. The miners are also to have a check weighman, whose salary will come from the employes. The company also agrees that no blacklisting will be done among union men. Work will be resumed in the mines of Coal Creek, Rockvale and Brookside, where about 1500 men have been out.

The Cotopaxi ore goes 28% copper. The property is 6 miles from Howard, on the Denver & Rio Grande Railroad, and is owned by the Cotopaxi Co.

GILPIN COUNTY.

Near Central City is the Scandia mine in Illinois-Central district. The shaft is over 650 feet deep. Yellow and gray copper ore is being piled up for shipment.

The East Boston mine, in Central City, will have a shaft 500 feet deep.

The shaft on the Annex mine, in Lake district, will be sunk 400 feet.

GUNNISON COUNTY.

The Dubois tunnel, the property of the Dubois T., M. & M. Co., S. L. Ely secretary and G. W. Griffey general manager, Dubois, has a tunnel now in 1070 feet, which is being driven to tap the Pride of Denver vein, which is 30 feet between walls. The tunnel is to cut it at a depth of 450 feet. It will be reached by the tunnel at a farther distance of 230 feet.

LAKE COUNTY.

The Leadville scale of wages is now established at $3 per day.

From Leadville A. Davis has sent 500 tons zinc ore through Jacobsen & Co. for the European market.

At Leadville the Banker M. & M. Co. of New York, on Breece hill, is developing between the 200 and 1100-foot levels in the Banker shaft. Manager Guth expects to make a copper mine of it.

At Leadville the Small Hopes M. Co., S. W. Mudd, manager, has voluntarily raised the wages of the miners from $2.50 per day to $3 per day.

The daily output from Leadville district averages 2500 tons.

A pumping feat was successfully accomplished at the Revenue No. 1 shaft one afternoon recently, says the Leadville Herald-Democrat. When the steam was first raised in the boiler the station pump was under 80 feet of water at a depth of 400 feet, while the sinkers were 60 feet farther below. The station pump and sinkers had been recovered, and active mining has commenced in the lower drift along the first contact. Under ordinary circumstances this work would require several weeks, but a little ingenuity enabled the work to be done in less than three days. When work at the Revenue closed last year the pump was carefully overhauled, check valves placed in position and the mechanism given a good dose of oil. It was Manager Estey's idea that, with this careful preparation, the pump could remain under water for a considerable length of time, and when operations were to be resumed all that need be necessary would be the turning on of the steam. When the practical test was made it was a success. The steam shot down through 80 feet of pipe, which was surrounded by the cold water. There was, of course, much condensation at first, but presently a movement could be discovered. Eighty feet below, buried beneath the water, the ponderous mechanism began moving, and presently the water began to pour out of the pipe. As the machinery became warmed to its work the strokes increased, and 300 gallons a minute were flowing to the surface; the third day the sinkers had been recovered and the lower drift drained of water.

MINERAL COUNTY.

The erection of the Big Kanawha Co.'s 300-ton concentrating mill at Creede has begun.

OURAY COUNTY.

At Ouray the Camp Bird mine and mills give employment to 400 men and the wages average about $4 per day. Besides twelve or fourteen six-horse teams hauling ore from the mine to the mills, there are a number of pack trains similarly engaged. The total expense of conducting operations there is estimated at $2500 a day.

PARK COUNTY.

The Dakota group, Pennsylvania mountain, Alma district, will be worked by the Bonanza G. M. & M. Co. and new machinery put in.

PITKIN COUNTY.

At Elko, on Rock creek, the tunnel will be started next month to run 3000 feet into Galena mountain. It will be 8x7 feet in the clear. The large mill will be completed and in operation June 1.

Notice of application for patent of the largest group of claims ever surveyed for patent in the United States, comprising sixty-four claims on Islet mountain, in Quartz Creek district, the property of A. E. Reynolds, appears in the Pitkin Miner this week, occupying one page of that paper.

RIO GRANDE COUNTY.

At Summitville forty men are at work; 180 tons of copper ore have been shipped.

SAN JUAN COUNTY.

At Silverton the Hercules M. Co., Manager T. Kane, will extend the drift on the vein in the Empire tunnel to run under the ore shoot in the upper workings on the Montezuma tunnel. Thirty-five men are employed. As soon as the mill is put in operation the force will be increased to seventy-five.

The Eureka Exploration Co. has purchased a group in Burns gulch and the Silver Wing mill. The Frederica is the principal claim of the group. Another property owned by the company is the Scotia group, in Picayune gulch. The company proposes to erect an electric power plant on the Animas below the Ridgway for the generation of power for operation of electric drills, and also to connect the mines of its Burns gulch group with the Silver Wing mill by an aerial tramway.

The San Juan M. & D. Co., A. P. Ptolemy, Supt., is pushing work on the Silver Queen, Arrastra gulch. The Silver Queen tunnel is designed to cut five separate veins.

SAN MIGUEL COUNTY.

The Smuggler-Union Co. will not build a new mill on the Contention mill site near Telluride. An addition of forty stamps will be made to the old mill at Pandora. A gravity tram will be run from the Contention group, giving the two plants 160 stamps.

A New York company has been organized to work the Keystone placers.

SUMMIT COUNTY.

At Breckenridge the Iron Mask G. M. Co. has incorporated, to sink a deep shaft on their property, 1 mile from Breckenridge.

TELLER COUNTY.

The driving of the last spike on the Colorado Springs & Cripple Creek Short Line Railway was celebrated at Cripple Creek last Saturday.

The Bertha B. claim, on Raven hill, is sold to the Palo Alto G. M. Co., a new corporation, for $100,000.

Sylvanite ore is found in the Hummer lease, block 8 of the Gold Bond Con. Mines Co., Gold Hill; about 4 feet of pay value.

At shaft No. 2, 820 feet deep, a 30-drill compressor will be put up by June 1.

Work has resumed on the Jolly Tar, south of the Strong mine, Victor. The property has a 500-foot shaft and several hundred feet of drifts and crosscuts.

At Victor the double compartment shaft on the lower end of the Orphan Belle will be sunk by the Isabella people to a depth of 800 feet.

A local report says that fifteen tons of ore taken from the deepest workings, 1050 feet, of the Last Dollar mine at Victor have been shipped to the smelters, and that it is estimated to contain about $2000 per ton.

IDAHO.

BLAINE COUNTY.

H. L. Hollister of the Golden Star, Hattie and Jumbo group of mines of Hailey has, through Supt. Allen, made four locations appropriating 3900 cubic feet of the waters of the Malad and Big Wood rivers, to be used at the points of appropriation for electric generation of power and light for those properties.

BINGHAM COUNTY.

The Union Pacific and the White Knob Copper Co. have a contract for 100 miles of railroad from a point near Blackfoot to Houston, Custer Co.

ELMORE COUNTY.

C. T. Brockman, general manager Sawtooth G. M. Co., Rocky Bar, says the 20-stamp mill, commenced last year, will be completed this season.

FREMONT COUNTY.

H. Kerty has organized a company at La Belle to work Snake river gold-bearing sand by an electrical device.

IDAHO COUNTY.

The Jerico M. & M. Co., Seattle, Wash., has incorporated to operate the Dewey mine; C. A. Marriner, manager.

W. D. Boyer, manager Gold Point Co, Red river, Dixie district, projects plans for a new 60-stamp mill.

The Idaho-Comstock Co. of Dixie has been reorganized, capitalization $500,000; W. H. Phelps, manager. The property includes five claims and shows some rich free-milling ore. About 4000 feet of underground work had been done at the time of the shutdown; the owners will spend money in development this summer.

SHOSHONE COUNTY.

At Wallace W. T. Hales has bonded the Panhandle group for $50,000 and proposes to begin work April 1.

The U. S. mine, near Wardner, is yielding gray copper ore carrying 523 ounces silver per ton and 26½% copper.

In the Cœur d'Alenes are ten concentrators in operation, which handle between 4000 and 5000 tons of crude ore daily, producing about 600 tons of concentrates. At the same time it is estimated that 125 tons of ore, carrying 66 tons of lead and 4200 ounces of silver daily, go into the South Fork of the Cœur d'Alene river, the gross loss being $8000 per day, 300 days in the year, so that every year $2,400,000 is lost in the slimes from that district alone; deducting freight and smelter charges, the operators are out nearly $2,000,000 per annum. About the best results that have been attained there are the saving of 85% of the values.

At Wallace the crosscut on the Stevens peak has crossed 57 feet of the ledge without showing the opposite wall.——At Wallace the Mammoth M. Co. has the longest crosscut tunnel in the Cœur d'Alenes—3475 feet from the portal to the point of intersection of the vein.

Eastern reports are to the effect that the American Smelting & Refining Co. is negotiating with Cœur d'Alene producers of lead to bring about a reduction in the production there for six years, which, if so, would indicate that the decline in American consumption of the metal has been such as to make the holding of the lead market at present prices onerous to the company.

WASHINGTON COUNTY.

Manager Reed at Cuprum has been developing the Mineral World mine, owned by the Inca M. & M. Co. The ore carries silver bromide, fifty ounces per ton, and 10% copper. Council, the present terminus of the P. & I. N. Railroad, is 38 miles from the mine.

MONTANA.

The two new State laws affecting mining locations have been signed by Governor Toole. One provides that the work must be done within sixty days after the location is made instead of ninety, as formerly, and the erection of monuments must be done within thirty days after location. The other law provides for the filing of an amended declaratory statement—if at any time the locator shall find his first location was defective, he desires to alter his boundaries, or for any other reason, except that such amendment shall not work a forfeiture of the rights of others.

BEAVERHEAD COUNTY.

J. J. Cusick, manager Polaris mine, near Dillon, will build a new mill.

On August 29, 1900, after a run of twenty-five days, the furnace at Glendale was closed down and the Hecla Con. M. Co. began shipping its product to Omaha. The following summary covers shipments from September to December, inclusive:

	Cars.	Net returns.	Expenses.
September..	6....	$ 8,681 06	$ 8,596 76
October	5....	13,182 29	8,452 08
November..	5....	9,254 82	9,305 59
December ..	8....	15,287 34	9,815 12
Totals..	24....	$46,405 51	$36,169 55

Net profit, four months, $10,235.96.

BROADWATER COUNTY.

The Stolen Sweets mine at Winston is sold to Barton Sewell, general manager

American Smelting & Refining Co., for $15,000.

GRANITE COUNTY.

At Garnet the Mammoth and I. X. L. mines have put on additional men.——The Grant & Hartford mine has been bonded to Mullen & Hornbrook of Butte for $25,000.

JEFFERSON COUNTY.

J. Henry Longmaid has let a contract for rebuilding and repairing the mill buildings of the Elkhorn mine. Elkhorn will be a lively camp this summer.

MADISON COUNTY.

A strike is reported from the Sunshine mine in Argenta district, ore assaying 155 ounces silver and 29% lead to the ton. The mine is close to the old camp of Argenta, 14 miles from Dillon.

Four miles from Meadow Creek P. O. is the Madisonian mine, a three-compartment 450-foot shaft with a 45° incline. At every 100 feet there is a crosscut to the lead and drifts on the lead in every direction. Sixty-eight men are employed in the mine and mill at the present time with E. J. Trerise superintendent. The ore carries iron pyrites and copper, and the slimes carry as great values as the pulp. It can be treated successfully by the process now in use down to the 300 level, but at the 450, so far as shown by tests up to the present time, it becomes a concentrating and smelting proposition. It is the only mill in the State that precipitates with sulphuric acid; after precipitation the solution carries but a trace of gold.

SILVER BOW COUNTY.

Butte reports that on the 25th inst. the Nipper mine, another of the properties involved in the Heinze litigation, was closed down and 250 more men thrown out of employment as the result of the decision of the Supreme Court that the appointment of a receiver by the District Court was wrong. That makes the fifth shutdown within a month through the same cause, and about 1000 men are laid off as the result.

NEVADA.

ESMERALDA COUNTY.

At the new camp of Tonapah miners are paid $4 per day of eight hours.

HUMBOLDT COUNTY.

P. C. Ostrander reports a strike at Trinity, the ore running $200 to the ton.

Under the management of M. M. Baruh, the sulphur mine at Humboldt is now on a paying basis.

LANDER COUNTY.

The Nevada M. Co., at Berlin, 60 miles south of Austin, has a 30-stamp mill operating on gold ore.

LINCOLN COUNTY.

Sinking and drifting are in progress on the Ninety-nine mine; last car lot of ore averaged 30% Cu and netted $1500 to the owner, C. M. Over.

T. Ewing is pushing work on a copper prospect near the Potosi mine.

Walter Carter, Supt. of the various claims lately purchased by Los Angelenos, is pushing work on all of them.

Development work is pushed on the Boss, a gold and copper property; Supt., J. Connelly.

C. A. Beck will work the Vulcan group, a gold-copper proposition in the northeastern part of San Bernardino county, Cal.; surface assays: gold, $4; copper, 27%; silver, two ounces.

The Barefoot group (gold mines) are being surveyed for patent.

Development on the Green Monster shows large and continuous ore body—gold, copper and silver; J. Wilkinson, Supt.

Good Springs, March 24.

The Half Moon mine, at Pioche, put forty men to work last week.

STOREY COUNTY.

Supt. Ryan reports to the Comstock Pumping Association from Virginia that the water is 198 feet 6 inches below the 1950-foot level station.

WASHOE COUNTY.

At Reno the Star mine ore is sorted into three grades, sacked and piled in the ore house.

WHITE PINE COUNTY.

A $100,000 plant to treat the ores of the Chainman M. Co. at Ely will be in operation Oct. 1.

The Chainman M. & E. Co. has acquired the property of the Chainman Co. at Ely for $150,000.

NEW MEXICO.

GRANT COUNTY.

The Virginia mining district, from 2 to 5 miles south of Lordsburg, is the center of considerable activity, where development has uncovered good bodies of iron and copper sulphides, carrying gold, silver and copper values.

The Superior group, about 2½ miles from town, belongs to El Paso parties, who have sunk a 400-foot incline down the dip of the ledge. They struck water and heavy sulphides at 334 feet, at which level they have done some drifting. Shipments of the ore to El Paso brought returns of about $20 gold, 15 ounces silver and 8% copper. It was necessary to put in a pumping plant to handle the water.

The Eighty-five group, belonging to the Shakespeare M. Co., is being reopened, with the intention of erecting a concentrating plant. The headquarters of this company are in San Francisco, Jno. Leechman being president. Shipments of fifty cars of ore from this property some time ago are said to have run $400 to the car. It is claimed they have 6000 to 7000 tons of concentrating ore on the dump that will run $10 per ton.

The Orion, in the same district, is under the management of A. W. Gifford. This mine is fairly well developed and is a shipper. It is stated that shipments have returned a sufficient amount to pay for half of all the development. A shaft sinks 175 feet on the vein, from which levels in ore are run every 50 feet. They have a large tonnage of ore blocked out and development is in progress. The 5000 tons of ore on the dump, it is estimated, will run $12 to $18 per ton. The Orion Co. contemplate putting up a concentrating mill.

The Aberdeen Copper Co. of New York, of which R. H. Batchelor is manager, recently purchased twelve claims in the district, which are being developed. A good body of ore was struck in one shaft at 75 feet depth. On another claim a strong flow of water and sulphide ore was encountered at 60 feet depth. In this case the ore was a copper-lead sulphide, the lead being a galena, all carrying gold and silver.

Speaking generally for the camp, the ores are well suited to concentration. Mining, sorting, hauling to railroad, freight to El Paso and smelting charges aggregate about $20 per ton, hence only ores running as high as $30 to $35 per ton are shipped, the lower grades being piled up on the dumps for prospective concentrator work. Coal here costs $8 per ton in car lots, wood $4 per cord.

A cyanide plant and crushing mill are to be put up at Gold Hill, 12 miles northeast of Lordsburg, to operate on ores that carry flour-fine free gold. The property was sold by C. W. Maxson to an English company, and H. Wyndham of London will be in charge. WASCOTT.

Lordsburg, March 23.

The Wilson M. Co. recently purchased the Volcano group, located 7 miles north of Stein's Pass, on which they have erected a 10-stamp mill and other buildings. They also put in a 5-mile water line, which furnishes water for the camp. Their ore is free-milling.

The Mineral Mountain M. Co. have eleven claims, having an outcropping that shows green copper carbonates on the main ledge and iron pyrites carrying silver and gold in a cross vein. There are various veins that appear to converge into one. Development is in progress, a 200-foot shaft in ore and a vein tunnel having been driven, with a considerable amount of drifting on the vein from the shaft. This work shows the vein to be about 7 feet wide. The work has developed a good supply of water, which is considered important. On another portion of the group is another 100-foot shaft, with drifting on the vein. It is estimated that 27,000 tons of ore are blocked out which will average $15 per ton. C. W. Maxson of Lordsburg is manager.

Stein's Pass, March 24.

RIO ARRIBA COUNTY.

On the 25th inst. the new reduction plant of the Copper Hill M. Co. was completely destroyed by fire; the boiler house and tank were also destroyed; loss, about $75,000, at Rinconada.

SANTA FE COUNTY.

A mill is to be erected at Dolores to operate under the Edison invention for the dry washing of gold gravel.

The Cochiti G. M. Co. has increased the capacity of its mill at Albemarle by the addition of seven 70-ton tanks. It is also credited with intention to build a large new mill at Bland. The new stamp mill at Allerton is completed.

OREGON.

BAKER COUNTY.

Baker City will add $500 to the amount allowed by the State commission for a mineral exhibit at the Buffalo Exposition, a total of $2500.

W. Smith and Allen Bros. have sold the Don Juan and a three-fourths interest in the Dodo No. 2 mine, in the Robinsonville district, to E. D. Leclare for $10,000.

Two more carloads of machinery have arrived for the Quebec mine.

The Little Giant M. Co. of Liverpool, England, are dealing with the owners of the Magnolia mine for its purchase. The price asked is $60,000. This property was under bond to W. L. Vinson as representative of the Little Giant M. Co., and several thousand dollars was spent in development work, besides a complete 10-stamp mill was put up on the property.

There is an excellent opening for a sampling works at Sumpter. A large number of the new properties are in a position to ship small lots of ore.

A company has just been organized to purchase and exploit the Grand Trunk ground, lying between the Mammoth and Ibex mines.

The Wisconsin M. Co., east of town, are in 150 feet on the vein with their tunnel. The values are very satisfactory to the owners.

The shaft now being sunk by the Red Boy is down 100 feet. It will continue straight down 2500 feet.

The new plant of the Bonanza is nearly set up. Their electric plant is the largest in the district.

The number of men at the North Pole mine is being increased right along. This is the deepest mine in Oregon and one of the biggest producers,

Sumpter, March 26.

A strike is reported in the Racine copper group, 6 miles from North Powder, of three veins within 120 feet of each other—two copper and the third gold.

The Magnolia mine, 4 miles north of Granite, is bonded to C. Bahmford.

Work has been resumed at the Cornucopia mines.

JACKSON COUNTY.

F. Mixton of Rock Island, Ill., has bought Shearer Bros.' placer mines, Steamboat district, for $6000.

SOUTH DAKOTA.

CUSTER COUNTY.

The mica industry in this county is employing sixty men. The mica free from iron and cut into sheets ready for use brings from $1 to $10 per pound, depending upon the size of the sheets. The run of the mine is taken for from $50 to $80 per ton. Waste mica brings at the mine $25 to $35 per ton; stone mica, $1 to $5 per pound.

Custer reports a strike of tin ore in the New York mica mine; the ore shoot is 6 feet in width and runs 5% tin. The mine is owned by Dow Bros., Sioux City, Iowa.

LAWRENCE COUNTY.

The Homestake Co. will build a 200-stamp mill this season. When the De Smet at Central City starts, the company will have 900 stamps in operation.

UTAH.

BEAVER COUNTY.

The O. K. at Milford reports development of ore carrying 60% copper.

R. C. Chambers and associates of Salt Lake have bought a controlling interest in the Copper Ranch Co.—seventeen mining claims, in Rocky district—for $50,000.

BOX ELDER COUNTY.

In Park Valley the Century M. Co. has a monthly output of $3000.

JUAB COUNTY.

The Bingham Co. now has control of the Grand Central mine of Tintic, on the basis of $2,000,000 for the property, to secure its siliceous ores.

PIUTE COUNTY.

At Gold mountain the Deer Creek M. Co. has 2400 acres of ground adjoining the Annie Laurie and Golden Star. It is the intention to construct a wagon road from Marysvale, a flume and power house, and to follow it with a mill, the latter to be in operation by Aug. 1.

SALT LAKE COUNTY.

Upon the completion of the new $1,000,000 smelter at Murray the Germania will be remodeled and converted into a pyritic smelter, with equipment similar to the Bimetallic smelter at Leadville, Colo.

In the Louise M. Co.'s Bingham property Supt. Garretson has 4 feet of ore exposed in a vein 8 feet between the walls that will average $56 per ton in gold, silver and lead.

A Utah judge decided this week in a Bingham case that a government mineral surveyor cannot legally locate a mining claim.

Bingham producers are again agitating the project of a tramway to the valley smelters.

WASHINGTON COUNTY.

Thirty tons high-grade copper bullion have been shipped from the Dixie smelter at St. George.

WASHINGTON.

COWLITZ COUNTY.

Kalama, on the Columbia river, reports the discovery of gold-bearing ledges in several parts of the town.

FERRY COUNTY.

At Republic the Butte & Boston ore shoot has been found in a raise being made to connect it with the lower workings of the mine.

The Lorraine C. M. Co. of Hoquiam has bought the Wilmot group on Silver creek, near Keller, and expect to expend considerable money developing the property.

H. P. Heacock will superintend development on the Caledonia, at Keller.

OKANOGAN COUNTY.

A million dollars' worth of treasury stock in the Palmer Mountain Tunnel Co. has been sold to investors in London.

The crosscut at the 185-foot level of the Lakeview is in the ledge 22 feet. The hanging wall has not yet been reached.

Work has resumed on the Lisbon.——F. Grogan has organized the U. S. Reduction Co. to operate twelve claims on Little Mount Chapaca; a 1000-foot tunnel will be started.

STEVENS COUNTY.

At Colville, the Copper King on Douglas mountain has been bonded for $60,000.

FOREIGN.

AUSTRALIA.

Australasian gold production has increased since 1890, when the total was 1,587,947 ounces. The total for 1898 was 3,547,079 ounces; that for 1899, 4,461,105 ounces. The year 1900 has witnessed retrogression, the total being 4,174,811 ounces, showing a decrease of 286,294 ounces. Nearly every State has produced gold during the past year. The following table indicates the movement in the production of each State for the past year:

	Ounces.
New South Wales	345,000
New Zealand	371,993
Queensland	951,065
South Australia	29,397
Tasmania	89,000
Victoria	807,407
Western Australia	1,580,949
Total	4,174,811

BRITISH COLUMBIA.

The Hewett Syndicate at Silverton, Slocan Lake, will build a tramway.

On the 1st of January the American smelters refused to contract for any more silver-lead ore from the Slocan mines. Since then rumors have been numerous of mines that would close down; but, so far as known to your correspondent, the Whitewater mine is the only mine to suspend operations through inability to sell ore. They have about 800 tons of concentrates piled along the K. & S. track, ready for shipment. There is more ore in sight, and conditions are better for extracting the same than they have been since the mine resumed operations a year ago. The mill was closed down March 1st and all miners working on ore were laid off, reducing the force from about 110 men to about 30 men.

Sandon, B. C., March 17.

The Highland mine at Ainsworth has closed down. Increased charges for treatment and the low price of lead are the reasons assigned for the suspension of operations.

For the week ending March 9 Rossland broke its ore shipping record, sending out 8591 tons. The largest previous shipment thence in a week has been 7814 tons.

It is proposed to unite the Ward Horsefly and Horsefly Hydraulic G. M. Companies of Cariboo, the latter company being wound up, the stockholders of the Horsefly receiving two shares in the new joint company for each one held in the old one.

The Toronto-Lillooet Gold Reefs Co.'s cyanide mill started on the 4th inst. and is averaging forty tons daily.

The Rossland output for the week ending March 23 was 8160 tons. The correct figures for the year up to and including March 23 are 86,587 tons.

Near Slocan work is to be resumed this season on the Kalispell.

MEXICO.

The Melczer M. Co. are completing a 200-ton matte smelter at their Copite mines, 25 miles from Carbo station on the Nogales-Guaymas railroad. Carbo is 145 miles south of Nogales. This locality is at an altitude of 2800 feet above sea level, which is supplied with water through a pipe line from the Rio San Miguel, there being a pumping station at the latter place. Mesquite wood is used for fuel in furnishing steam. Shipments of supplies are by water to Guaymas or by rail via Nogales. The ores here comprise iron and copper sulphides, with considerable carbonates and lime, and are self-fluxing. At present about 300 men are on the company's pay roll, and this number will be increased. Most of the mining is done with air drills. The smelter was erected by the Union Iron Works of San Francisco; the furnace is 28x146 inches, and there are extensive flues for saving the values that otherwise would escape in the

fumes. It is expected the plant will blow in next week. A traction engine train is operated between Carbo and the mines. Melczer Bros. and associates are the principals in the enterprise. They have opened an office in Nogales, Arizona.

Carbo, Sonora, March 26.

The Promontorio mines, 28 miles southwest of Nogales, are being developed through shafts, inclines and tunnels. The ores are free milling and concentrating. At present there is a 10-stamp mill on the property, but a new mill will be built this season.

Nogales, Sonora, March 25.

T. E. Levy says that he has closed the sale in New York of the Guadalupe mines, in southwestern Chihuahua, owned by R. S. Tinnin of San Antonio and G. S. Holmes of Guadalupe, to New York men for $2,500,000, and that $500,000 is to be invested in machinery.

SOUTH AFRICA.

At Johannesburg one mining company has started crushing ore and four others are preparing to begin.

Personal.

JNO. BYRNE is reappointed Montana State Mine Inspector.

C. L. CORY has returned from Virginia, Nev., to San Francisco.

W. H. GAFFET is now Supt. Black Powder Works, Santa Cruz, Cal.

J. ROSS BROWNE has returned to San Francisco from Grass Valley, Cal.

C. L. DIGNOWITY is now general manager Arlington Copper Co., Arlington, N. J.

D. J. SAYER is elected manager Butterfly-Terrible M. Co., Ophir, San Miguel Co., Colo.

JAS. H. ROSS, the new Klondike Commissioner, says he expects to reach Dawson by April 10.

SAMUEL HIGGINS succeeds J. H. McConnell as Supt. of motive power of the Union Pacific system.

E. L. ALLEN of Auburn, N. Y., succeeds C. H. Deuell as Commissioner of Patents, Washington, D. C.

W. E. TERHUNE, of San Francisco, takes charge of the Nevada Copper Co. smelter, at Lovelock, Nevada.

F. C. SCHRADER AND W. Y. PETERS, U. S. G. S., have gone on a geological reconnoissance of northern Alaska.

S. W. STRATTON has been appointed director of the new standardizing bureau, at Washington, D. C., editorially noted last week.

J. W. FINCH of Victor, Colo., has been appointed State Geologist of Colorado. He has been consulting engineer Gold Coin M. Co.

L. H. STOCKBRIDGE is manager Cook, Fisk, Gregory and Bobtail mines, Black Hawk, Colo. James Carbis is underground foreman.

GEO. H. PROCTOR is in California and is said to be "projecting" a railroad. He and Giles Otis Pearce in California at one time gild with glory the sunrise of the century.

H. D. C. RICHARDS, Supt. Orleans Bar G. M. Co., is in San Francisco to meet W. D. Baldwin, the president of his company, who comes from New York to visit the mine at Orleans, Cal.

EDWIN REYNOLDS, vice-president and general superintendent E. P. Allis Works, Milwaukee, Wis., was presented with a $1500 desk by the officers and employes of the company on his 70th birthday, on the 23rd inst.

WM. MCKINLEY, President of the United States, will dedicate a fountain presented by the Donohoe estate to the mechanics of San Francisco, in front of the office of the MINING AND SCIENTIFIC PRESS, on May 21, 1901.

BERNARD MACDONALD AND EDMUND KIRBY, general managers Le Roi, War Eagle and Center Star mining companies, Rossland, B. C., have returned from Victoria, where they went on behalf of the Mine Owners' Association of Kootenay in an effort to have the law repealed which imposes a 2% tax on net shipment values of ore from British Columbia mines.

Obituary.

GEORGE SANDOW of San Francisco was killed on the 23rd inst. by falling down a shaft at the Yellow Aster mine, Randsburg, Cal. The deceased was a prominent mining and civil engineer, a genial, pleasant man and a general favorite.

Recently Declared Mining Dividends.

	Payable.
Amalgamated Copper Co., Montana, regular quarterly 1½% and ½% extra	April 29
Ingham Con. G. M. Co., Colo., 1 cent per share, $3500	March 28

Commercial Paragraphs.

THE Compressed Air Machinery Co. is enlarging its facilities at 11-13 First St., San Francisco.

THE Lacy Manufacturing Co. of Los Angeles, Cal., has completed a line of 4-inch pipe for the Exposed Treasure M. Co., near Mojave, Cal.

THE Rix Compressed Air & Drill Co., San Francisco, has moved into the new brick building at the corner of Fremont and Mission streets, San Francisco.

THE California Hydraulic Engineering & Supply Co., San Francisco, whose offices are now in the Mills building, will occupy the new building Nos. 17-19 Fremont street, San Francisco.

BEGINNING with the 1st prox., Mr. George E. Ames will be the Pacific coast representative of the mining machinery firm of Fraser & Chalmers of Chicago and London. Mr. Ames' office will be Room 15, No. 137 Montgomery St., San Francisco.

THE American Smelting & Refining Co. ordered of the Denver Engineering Works of Denver, Colo., eight large water jacket smelting furnaces for a new smelting plant it is building at Salt Lake City, Utah, together with complete equipments for the same.

THE Machinery & Electrical Co. of Los Angeles, Cal., have completed the installation of a compound duplex mine pump for the Central Oil Co.; also a 60 H. P. horizontal tubular boiler. This is designed to deliver 10,000 gallons per hour to the new reservoir of the Central Oil Co. on their lands at Whittier, Cal., at an elevation of 750 feet through 12,000 feet of pipe.

AN order has been placed with the Edward P. Allis Co. of Milwaukee, through their Spokane office, by the Mountain Copper Co., Ltd., of Keswick, Cal., for machinery for a copper converting plant, consisting of three stands of converters, blowing engine, electric crane and all necessary appurtenances. It is expected that the plant will be in operation in about six months. The total shipping weight of the machinery sold is approximately 500,000 pounds.

CHARLES H. UNVERZAGT, formerly president Hooper Pneumatic Milling Co., 517 West Thirtieth street, New York City, engaged in the business of milling and the concentration of ores without the use of water, has sold a 51% interest in the company, with special reservation of a number of machines for his own use, and proposes to shortly remove west. Under date of March 16 he writes: "The reservation of machines will require $1,000,000 to capitalize same for use in milling plants and a company for which purpose will be formed in the fall." He also states that his successors propose developing the Hooper pneumatic milling system for the dry concentration of ores on a large scale, not only in its sale and introduction, but also in its use in personal mining operations of the syndicate. The Hooper Pneumatic Co. have closed a contract in Mexico for exclusive license to manufacture, sell and use the process in Mexico. The contract is stated to have been undertaken by representatives of iron and steel works at Durango, Mexico. The company has recently shipped nine machines to the Eagle Fluor Spar Co. in Kentucky, who have been using three machines for some time. Shipments have also been made to Colorado, Pennsylvania, Indiana, and an order is reported for a copper company.

Notices of Recent Patents.

Among the patents recently obtained through Dewey, Strong & Co.'s SCIENTIFIC PRESS U. S. and Foreign Patent Agency, the following are worthy of special mention:

BALING PRESS.—No. 670,175. March 19, 1901. Wm. H. Gray, San Leandro, Cal.

This invention is for improvements in hay presses, and it consists essentially of a door fixed to and turnable with a shaft upon one side so as to move through a projecting hopper, into which the material to be pressed is placed in successive charges. Power devices act to swing the door so as to force the charge from the hopper into the press, and when the press is sufficiently filled the door is latched, the follower is moved upward to compress the bale, and at the instant when the compression is complete the latches are disengaged and the parts restored to the position for making another bale.

CAN FILLING MACHINE.—No. 670,182. March 19, 1901. Erik Manula, Astoria, Or.

This invention is designed for filling cans with salmon and the like, and consists essentially of an intermittently revolving can feeder, a cylinder having therein a series of measures into which the fish is compressed, and means by which these measures are successively emptied into the cans. Combined therewith are telescopic tubular jaws into which the fish is fed and by which it is delivered into the measures, and a revolving knife by which the fish is cut off when the measures are filled.

CAN SOLDERING MACHINE.—No. 670,180. March 19, 1901. Erik Manula, Astoria, Or.

This invention relates to can soldering machines, and consists of an adjustable feed device, acid trough and solder trough in line and in different planes and adjustable with regard to each other. In conjunction with these are two spirals of different length axially in line and parallel to the two troughs, one governing the advance of the cans through the acid bath, and one the advance through the solder bath.

CAN SOLDERING MACHINE FEED DEVICE.—No. 670,181. March 19, 1901. Erik Manula, Astoria, Or.

This invention relates to an improved feed device for spirally feeding cans in a can soldering machine. It consists of a revoluble inclined support or cone upon the feed end of a spiral driver, with guiding devices by which the can is guided and given the inclination which it is to maintain after entering the acid or solder bath.

ACETYLENE GAS GENERATOR.—No. 670,196. March 19, 1901. E. R. Cook, Sacramento, Cal.

This apparatus is especially intended for the production of acetylene gas, its storage under constant pressure, and its particular application for locomotive headlights. It comprises a novel combination of the generator and gas holding chambers, the removable carbide trays, and means for automatically supplying water to each successively as fast as the previous one becomes exhausted.

List of U. S. Patents for Pacific Coast Inventors.

REPORTED BY DEWEY, STRONG & CO., PIONEER PATENT SOLICITORS FOR PACIFIC COAST.

FOR WEEK ENDING MARCH 19, 1901.

669,979.—CONVEYOR CHAIN—E. T. Bucknam, Tulare, Cal.
670,196.—GAS GENERATOR—E. R. Cook, Sacramento, Cal.
670,175.—BALING PRESS—W. H. Gray, San Leandro, Cal.
670,177.—SHINGLE MACHINE—J. D. Griffith, Point Arena, Cal.
670,232.—GATE—C. M. Hooper, Pullman, Wash.
670,390.—CAN MAKING MACHINE—M. Jensen, Astoria, Or.
670,136.—OIL CAN FAUCET—W. Laudahn, S. F.
670,180.—CAN SOLDERING MACHINE—E. Manula, Astoria, Or.
670,181.—CAN SOLDERING MACHINE FEED—E. Manula, Astoria, Or.
670,182.—CAN FILLING MACHINE—E. Manula, Astoria, Or.
670,409.—SOLE TRIMMER—E. F. Maxwell, S. F.
670,185.—MOP HEAD—J. F. McCleary, S. F.
670,005.—ROTARY ENGINE—F. H. Palmer, Elma, Wash.
670,032.—WINDOW—E. Parmentier, Vancouver, Wash.
670,376.—EXTENSION PLUG—P. H. Quinn, Pasadena, Cal.
670,391.—PRINTING PRESS FEED—R. Robinson, New Whatcom, Wash.
670,259.—GAS GENERATOR—J. Trullinger, Bakersfield, Cal.
670,070.—DISK HARROW—Willis & Porteous, Fresno, Cal.
670,071.—HARROW TOOTH FASTENER—G. T. Willis, Fresno, Cal.
670,092.—ORE CAR—G. E. Woodbury, S. F.
34,236.—DESIGN—B. P. Herndon, Florence, Ariz.
34,241.—DESIGN—A. H. Leach, Los Angeles, Cal.

AT Trenton, N. J., on the 28th inst., the Court of Errors and Appeals, by a vote of 9 to 5, decided to reverse the Chancellor's decision in the American Smelting & Refining Co. case. This decision orders the issuance of an injunction restraining the American Smelting & Refining Co. from taking any further action in the matter of increasing its capital stock or of acquiring by purchase the property of M. Guggenheim's Sons, unless it be made to appear on final hearing that the stock to be issued for the purchase of the Guggenheim plant does not exceed the value of the property to be acquired by the purchase.

Latest Market Reports.

SAN FRANCISCO, March 28, 1901.

SILVER—Per oz., Troy: London, 27½d (standard ounce, 925 fine); New York, bar silver, 59¾c (1000 fine); San Francisco, 59¾c; Mexican dollars, 49¾c San Francisco, 49c New York.

The Indian Secretary in the British House of Commons on the 26th said the Government had no intention of again considering proposals for the free coinage of silver in India. The coinage last year was sixteen crores, nearly as much as the highest free coinage year, 1877-78. G. Balfour, president of the Board of Trade, also said that no steps had been taken to call an international bimetallic conference.

COPPER.—New York: Lake, 1 to 3 casks, $17.25; carload lots, $17.00; Electrolytic, 1 to 3 casks, $16.75; carload lots, $16.50; Casting, 1 to 3 casks, $16.65; carload lots, 16.50. San Francisco: 18. Mill copper plates, 20c; bars, 22@23c. London: £68 17s 6d per ton.

The Boston News Bureau says: "The copper market is being held up by main strength and the Standard Oil millions, and the metal people are figuring that it can be sustained for perhaps sixty days longer at present prices, but stocks are declared to be accumulating and, unless there is a change in conditions, prices must give way this summer."

LEAD.—New York, $4.42½; Salt Lake City, $4.00; St. Louis, $4.22½; San Francisco $5.00, carload lots; 5½c 1000 to 4000 lbs.; pipe 6¾, sheet 7½, bar 6c; pig, $4.70 @5.10. London, £13 3s 9d per ton=2.86½ cents per lb.

SPELTER.—New York, $4.20; St. Louis, $3.75; London, £16 2s 6d per ton =3.5 cts. per lb; San Francisco, ton lots, 5¼c; 100-lb lots, 6c.

ANTIMONY.—New York, Cookson's, 10c; Hallett's, 9½c; San Francisco, 1000-lb lots, 12c; 300 to 500 lbs., 13@14c; 100-lb lots, 15@18c.

IRON.—Pittsburg, Bessemer pig, $17.25; gray forge, $16.50; San Francisco, bar, per lb., 2.65c in small quantities.

STEEL.—Bessemer billets, Pittsburg, $23; open hearth billets, $26.50; San Francisco, bar, 7c to 12c per lb.

TIN.—New York, pig, $26.50; San Francisco, ton lots, 29c; 1000 lbs., 29¼c; 500 lbs., 29½c; less, 30c; bar tin, ℔ lb, 35c.

QUICKSILVER.—New York, $51.00 large lots; London, £9 2s 6d; San Francisco, local, $47.00 ℔ flask of 76½ lbs.; Export, $45.00

MAGNESIUM.—New York, $2.90 ℔ lb.; San Francisco, $3.75.

ZINC.—San Francisco, 5½c; slab, 5¾c; bar, 7c; zinc dust, N. Y., 8c.

BABBITT METAL.—San Francisco, No. 1, 10c.

SOLDER.—Half-and-half, 100-lb. lots, 18½c; San Francisco, Plumbers', 100-lb. lots, 15½c.

ASSAY LITHARGE.—San Francisco, 10c ℔ lb, small lots.

BISMUTH.—New York, ℔ lb., $2.25 50-lb lots; San Francisco, $2.50 to $2.75 lb lots.

PLATINUM.—San Francisco, crude, $18 ℔ oz.; New York, $18.20 per Troy oz

ALUMINUM.—New York, No. 1, 99% pure ingots, 35c; No. 2, 90%, 30c to 35c.

FERRO-MANGANESE.—Pittsburg, 80%, domestic, $62.50, large lots.

TUNGSTEN.—New York, ℔ lb., 95c; San Francisco, $1.15.

FERRO-TUNGSTEN.—New York, 37%, 32c; San Francisco, 65c (60%).

NICKEL.—New York, 50@60c ℔ lb.

PHOSPHORUS.—F. o. b. New York 50@60c ℔ lb.

POWDER.—F. o. b. San Francisco: No. 1. 70% nitro-glycerine, per lb., in carload lots, 15½c; less than one ton, 17½c. No. 1*, 60%, carload lots, 13½c; less than one ton, 15½c. No. 1** 50%, carload lots, 11¾c; less than one ton, 13¾c. No. 2, 40%, carload lots, 10c; less than one ton, 12c. No. 2* 35%, carload lots, 9½c; less than one ton, 11½c. No. 2** 30% carload lots, 9c; less than one ton, 11c. Black blasting powder in carload lots, minimum car 728 kegs, $1.50 per keg; less car lots, $2 per keg.

CAPS.—3x, $5.50 per 1000; 4x, $6.50; 5x, $8; Lion, $9, in lots not less than 1000.

FUSE.—Triple tape, $3.60 per 1000 feet; double tape, $3.00; single tape, $2.65; Hemp, $2.10; Cement No. 2, $3.00; Cement No. 1, $2.65, in lots of 3000 feet and up.

CANDLES.—Granite 6s, 16 oz., 40s., 11½c ℔ set; 14 oz., 40s., 10c.

CHEMICALS.—Cyanide of potassium, 98%-99%, jobbing, 32½@33½c ℔ lb.; carloads, 30@31c; in 10-lb. tins, 40c; sulphuric acid, in carboys, 66% B, 2c ℔ lb.; soda ash, $1.90 ℔ 100 lbs. 58%; hyposulphite of soda, 2¾@3c ℔ lb.; blue vitriol, 5¾@6½c ℔ lb.; borax, concentrated, 7@8c ℔ lb.; chlorate of potash, 12@13c; roll sulphur, 6c; alum, $1.90@2.00; flour sulphur, French, 2½@ 2¾c; California refined, 1¾@2c; nitric acid, in carboys, 8c ℔ lb.; caustic soda, in drums, 3@4c ℔ lb.; Cal. s. soda, bbls., $1.00; sks, 95c ℔ 100 lbs.; chloride of lime, spot, $2.50@2.60; nitrate of potash, in kegs, 8c; caustic potash, 10c in 40-lb. tins.

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Situations Wanted 1
Skinner Co., H. E. —
Smidth & Co., F. L. 19
Smith, S. Morgan Co. 13
Smith & Co., Francis 12
Smith & Thompson 14
Smooth-On Mfg. Co 12
Snedaker, James Angus 14
Snodgrass, S. K. 2
South Sliger Gold Mining Co. 19
Spokane Galvanized Wire Rope Co. 19
Star Drilling Machine Co. —
State Ore Sampling Co. 14
Stevens, Ralph E. 14
Stillwell-Bierce & Smith-Vaile Co. 20
Strout & Son, W. H. 14
Sturtevant Mill Co. 12
Sullivan Machinery Co. 7

T

Tatum & Bowen 20
Taylor Iron & Steel Co. 18
Taylor & Co., John 15
Taylor & Co., P. T. —
Thomson & Boyle Co. 17
Trenton Iron Co. 18
Tyler, S. W. 14

U

Union Gas Engine Co. 8
Union Iron Works 21
Union Pacific Railway 19
Union Photo-Engraving Co. 20

V

Van Der Naillen, A. 14
Van Slooten, Wm. 14
Van Wagenen, Theo. F. 14
Vulcan Iron Works 13

W

Wanted 1
Weber Gas & Gasoline Engine Co. 20
Weigele Pipe Works —
Western Chemical Co. 18
Westinghouse Electric & Mfg. Co. 10
Wetherill Separating Co. 13
Wigmore & Sons, John 17
Wimmer, Geo 17
Wohler, Bartning Sue's 12
Wolff & Zwicker Iron Works 15
Wood, Henry E. 14
Woodbury, Geo. E. —
Wynkoop, W. C. 14

Y

Yawger, I. C. 7

Z

Zeller, Geo. A. 1

SITUATIONS WANTED.

Thoroughly Experienced Physician and Surgeon, lately returned from mining country, would like position with mining company, or pro rata salary in mining or oil camp. "M. D.," care this office.

A Mining Engineer with many years' experience as manager of large properties in the United States and Mexico, is open to an engagement as manager or superintendent. Possesses both executive and managerial ability and can furnish the best of testimonials Address Box 29, care of this office.

TO GOLD DREDGING COMPANIES.

A mining and electrical engineer, with six years' experience at successful gold dredging, is desirous of obtaining a position as superintendent with a dredging company. Can design machinery to suit any conditions. Address "Gold Dredge," this office.

ABOUT May 10, a young man wishes position as assayer or assistant assayer and surveyor; has had practical experience, including cyanide work, with college training; wider experience desired; moderate pay with chance for advancement; references Address "Gabbro," this office.

WANTED.—A POSITION AS AN ASSAYER and General Assistant, if desired. Ten years' experience in general mining. Two years managing mines in Mexico. Practical knowledge of language. Address Box 28, care of this paper.

Situation Wanted by Mining Engineer of 20 years' experience in California, Colorado, Mexico and Germany. Has had charge of large properties—gold, silver, lead, copper, sulphur and oil. College graduate; good assayer, surveyor and accountant; speaks Spanish. Has experience in railroad construction and road building. Formerly U. S. deputy mineral surveyor and member of geological field force. Will go anywhere. Address P. M., Mining and Scientific Press.

Engineers, Firemen, Machinists, Electricians:

Send 10 cents for new 40-page pamphlet containing list of questions asked by examining Board of Engineers. GEO A. ZELLER, Publisher, St Louis, Mo.

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IN LOTS TO SUIT.

Send for Quotations.

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WE BUY very rich Ores, Dental Scraps, Tellurium Ores, Mill Wastes, Jewelers' Sweeps, Gold Retorts, Old Iron Retorts, Base Amalgam, Quicksilver, Amalgamated Plates, Gold and Silver, Old Slags.

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WANTED.

WANTED.---TWO EXPERIENCED COPPER SMELTERS.

Enquire or address F. A. HUNTINGTON, Room 1, Third Floor, Mills Building, San Francisco, Cal.

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WANTED--Belt Driven Air Compressor.

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Wanted, partner with $10,000 gold for development; can get half interest in gold, silver and lead mines (five). Plenty of concentrating ore averaging 25 ozs. silver to the ton of 2000 lbs.; gold, ¼ oz. Water power and timber close to the mines.

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And Other Chemicals for Mining Purposes.

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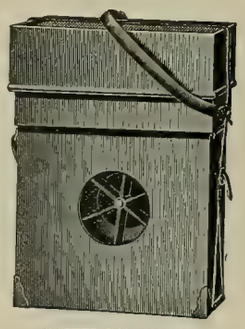
Gold, Silver-Lead and Copper Properties. Excellent chance for profitable investments in legitimate mining in BRITISH COLUMBIA. Capital needed for developing promising prospects. A specialty made of FREE MILLING GOLD properties. Very promising FREE MILLING GOLD properties for sale; terms reasonable. Mines examined and reported on by reliable mining engineers. Correspondence solicited Address Andrew F. Rosenberger, P. O. Box 700, Nelson, B. C.

DRY PLACER MACHINES.

THE PNEUMATIC PROSPECTOR.

Size 6x11x14 in. Weight only 10 lbs.



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Gives a clean prospect from placer ground or free-milling ore by compressed air. The operation is purely mechanical. No chemicals, no quicksilver; no black sand remains with the gold. Will do work equal to careful panning.

THE PNEUMATIC SEPARATOR.

Weight 160 lbs.

Has a capacity of 20 to 30 cu. yds. of gravel per day. Will save fine and coarse gold and nuggets of any size, comparatively free from black sand. Will do better work under favorable circumstances than a sluice box. Indispensable for dry countries.

SEND FOR DESCRIPTIVE CIRCULAR.

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Inventor and Manufacturer,

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THE CALIFORNIA DEBRIS COMMISSION, HAVING received applications to mine by the hydraulic process from F. C. LeBlond and W. E. Olmstead, in the Chanarral Hill Mine, near Downieville, Sierra Co., to deposit tailings in Goodyear Creek; from Ah Lung, in the Fuller Flat Mine, near Scales, Sierra Co., to deposit tailings in Canyon Creek; from J. H Skinner, in the Lava Point Mine, at Hepsidam, Sierra Co., to deposit tailings in Whiskey Creek; from J. W. Dempsey, in the Hungarian Hill Mine, near Quincy, Plumas Co., to deposit tailings in Whiskey Creek; and from J S. Carter and Wm. Deal, in the Cadmus mine, at head of Peters Creek, Plumas Co., to deposit tailings in Peters Creek, gives notice that a meeting will be held at Room 59, Flood Building, San Francisco, Cal., on April 15 1901, at 1:30 P. M.

FOR SALE.

FOR SALE.

ONE COMPLETE PLACER MINING DREDGE

OF THE ELEVATOR TYPE.

With buckets having capacity of seven and a half cubic feet. Dredge only used few months. Located on Grasshopper creek, near Bannack, Mont. For full particulars, address THE BUCYRUS COMPANY, South Milwaukee, Wis.

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I have some splendid Air Compressors, Hoisting Engines, Rock Drills, Rock Crushers, Channeling Machines, Steam Pumps, Boilers, Steam Shovels, Locomotives and Relaying Rails, all in splendid condition. Send for printed list and specify your requirements. I can save you money.

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627 New York Life Bldg., CHICAGO.

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THE S. H. SUPPLY CO.,

22d and Larimer Streets,

DENVER, COLORADO.

The Largest Machinery Depot in the West.

We shall be pleased to send you complete specifications of the following. This is only a partial list; send for complete list No. 41.

BOILERS.
2 100 H. P. HEINE WATER TUBE.
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1 35 H. P. TUBULAR.
20 SMALLER VERTICAL BOILERS.

ENGINES.
2 18x42 FRASER & CHALMERS CORLISS.
1 18x36 BASS CORLISS.
14x20 ATLAS AUTOMATIC.
12x18 SKINNER SLIDE VALVE.
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25, 20, 15, 10, 8, 6 H. P. SLIDE VALVE ENGINES.

GASOLINE ENGINES.
15, 12, 10, 4 and 3 H. P. GASOLINE ENGINES.

PUMPS.
12x8½x10 and 6x4x6 WORTHINGTON DUPLEX.
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7x4x10 DAVIDSON, 10x5x12 SMITH-VAILE.
12x7¼x12 MARSH, 6x6¾ KNOWLES.
90 BOILER FEED PUMPS
FRENIER'S SPIRAL PUMP.

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20 850-LB. RAPID DROP STAMPS.
14 AMALGAMATING PANS.
11 SETTLERS.
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10 AMALGAM SAFES.
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14 WILFLEY TABLES
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3 SET F. & C. 30x10 ROLLS.
1 SET CORNISH ROLLS.
5 PEBBLE PULVERIZERS.
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PIERCE ROASTING FURNACE.
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MISCELLANEOUS.
Thousands of feet of RUBBER AND LEATHER BELTING, taken from the mills which we dismantle.
Hundreds of tons of SHAFTING, that for use is as good as new.
1500 of all sizes of PULLEYS, both wood and iron.
BOXES, HANGERS, COLLARS, COUPLINGS.
SECOND-HAND PIPE that has all been carefully rethreaded and guaranteed to be free from holes or splits.
All sizes of VALVES, and large quantities of BRASS GOODS of all kinds.

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All prices are put in plain figures. No discounts.

THE S. H. SUPPLY CO.,
The Largest Depot for Slightly Used Mining and Milling Machinery in the World,
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A Bruckner Roaster, 8'6"x26'6", with fire-box complete; also Chlorinating Barrel, 5'x9'.

Machinery new, never having been set up. Will sell at a discount f. o. b. Denver.

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18 Months' Bond. Easy Payments.

Five Separate Leads, All Carrying Ore.

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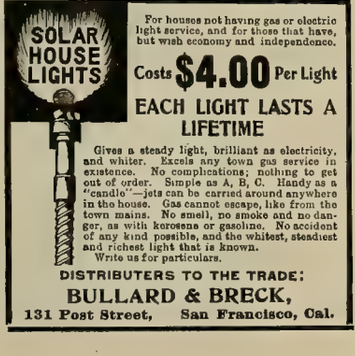
If interested, write for our "Data" concerning Platinum. We buy Scrap Platinum.



THE SNODGRASS HAND POWER COMMON SENSE PULVERIZER & CONCENTRATOR.

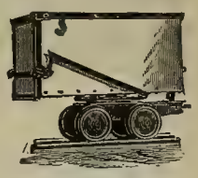
This Hand Power Machine is built on the same general principle as the regular machines, only being smaller in size and capacity. While this is intended to be run by hand power, it can easily be changed for steam or gasoline by simply putting on the pulley in place of the gearing. This has a capacity of 1½ to 2 tons per hour This is just the machine for working at Cape Nome and other places where it is difficult to procure wood, coal, or gasoline for power. It requires but a small amount of water, and a pump can be attached, so that one person can pump the water as well as run the machine. It can easily be moved from place to place, as the heaviest part only weighs about 250 lbs., the total weight being about 500 lbs.

Address S. K. SNODGRASS, DENVER, COLO. (The Windsor.)

Truax Automatic Ore Cars.

Special Side Dump Car, Patented.

COST NO MORE THAN COMMON CARS.



End or Side Dump Car, Patented.

We build these cars in a shop devoted exclusively to their manufacture, using the best quality of Steel and Malleable Iron, thus assuring strength and durability.

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Sole Manufacturers for the Pacific Coast.

Sold by Dealers. SEND FOR CATALOGUE.

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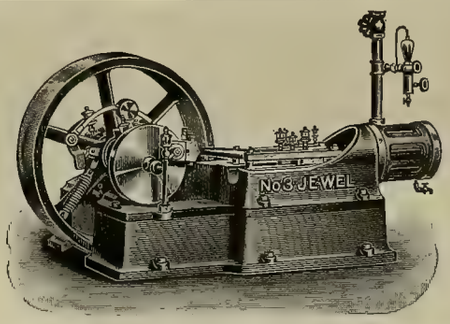

A THOROUGHLY RELIABLE, SIMPLE, HIGH CLASS, PERFECTLY GOVERNED AUTOMATIC ENGINE AT A REASONABLE PRICE.

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And COMPLETE EQUIPMENT for Placer Mines OUR SPECIALTY.

—WE BUILD—

GOLD DREDGES Complete in Running Order

to handle 2500 cubic yards per day at a cost of 3 cents per cubic yard.

We excavate 50 feet below water, 20 feet above water and handle boulders up to one ton weight.

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We build Water Wheels for any head and for any power. Complete electrical power generator wheels a specialty. Large wheels up to 50 feet diameter for driving compressors.

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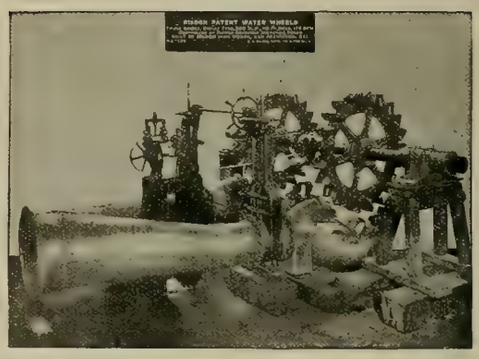

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50-Horse Power Traction Engine.

Freight carrying capacity of wagons, 16 TONS EACH, or a total capacity of train, 48 TONS.

CAPACITY OF ENGINE, 50-Horse Power.

Over One Hundred of these Powerful Engines in use on this Coast in the principal Logging and Lumbering Camps and for general freighting purposes.

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These outfits are particularly adapted to haul freight of any description from out-of-the-way places, and will reduce the cost of transportation at least one-half and in many instances two-thirds. They can generally be worked where animal teams now do the work, and haul their immense loads of from thirty to fifty tons, ascending and descending grades as much as 5 per cent to 30 per cent, depending upon condition of the road; loads may be increased to even greater amount on a firm and moderately level road.

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Estimates made for complete Steam Freighting Outfits. Address

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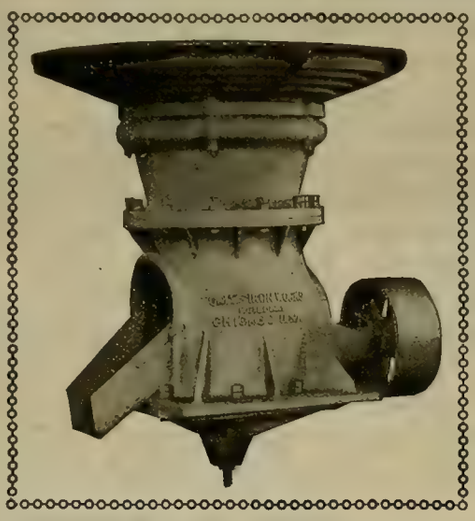
There are more than two hundred of these Breakers in the South African gold mines.

The Homestake Mining Co. of South Dakota, one of the largest mining properties on the North American Continent, paying a dividend every month, and having ore enough in sight to keep its 1000 Stamps busy for fifty years, uses

15 GATES ORE BREAKERS

and buys Gates justly celebrated Stamp Shoes in lots of 10,000.



We build every class of strictly modern

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For instance: The Trail Smelters and the Granby Consolidated Mining & Smelting Co.'s plant were supplied by us, and they are the model smelting plants of British Columbia. We guaranteed a capacity of 500 tons per day in the Granby Co.'s two furnaces, while they average 600 tons per day, and have handled as much as 736 tons of copper ore in twenty-four hours.

Gates Mining Machinery is always a little better than it is guaranteed to be.

We build the following Specialties besides those above mentioned: **Stamp Mills, High Grade Rolls, Dryers, Roasting Furnaces, Hoists, Elevators, Screens, Concentrators of every class,** and, in short, every improved mechanical device for working and reducing the precious ores. We built the first Stamp Mill ever set up in the Rocky Mountains. Our manufacturing history covers a period exceeding sixty years. We publish seventeen booklets fully describing our

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Showing Drum Attachment for Snaking Logs. The ONLY SUCCESSFUL ENGINE; works where others fail.

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Traction Engine

For Freighting and Logging.

50-HORSE POWER. CYLINDER 11 x 12. MAIN WHEELS 24" x 7' 6".

FOR FULL PARTICULARS, ADDRESS

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BUILDERS OF

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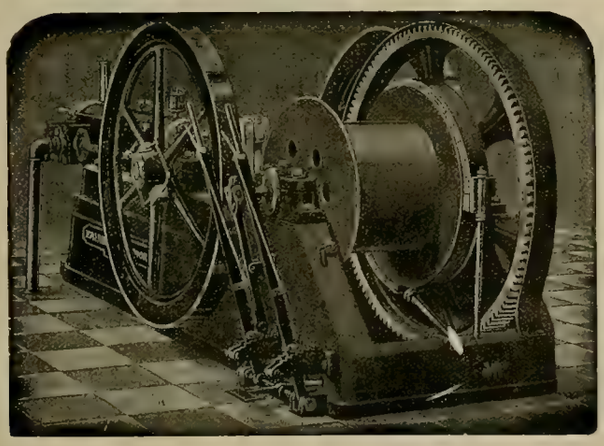
Represented by HOLT BROS. CO., 30 & 32 Main St., San Francisco, Cal.

Branch Office, Walla Walla, Wash.



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An efficient and reliable combination of a Fairbanks-Morse Gasoline-Distillate Engine on the same base with a Friction Hoist. Modern and up to date. We publish a special catalogue describing our Hoister which we gladly mail prospective purchasers.

FAIRBANKS-MORSE GASOLINE-DISTILLATE ENGINES.

ALL SIZES UP TO AND INCLUDING 54 HORSE POWER.
For Pumping, Milling, Lighting, Air Compressors, Etc.

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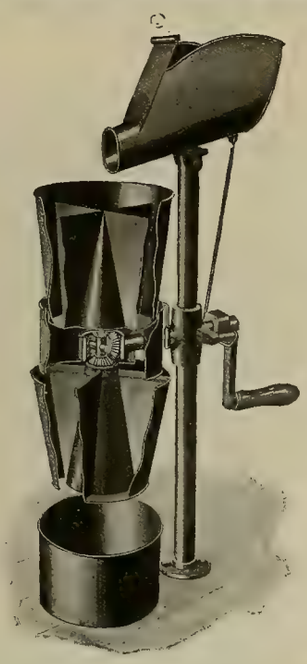
100 POUNDS OF ORE SAMPLED IN 10 MINUTES.

Calkins' Umpire Ore Sampler.

PAT. APPLIED FOR.

An accurate, quick and absolutely impartial machine for sampling ore in quantities of from one to one hundred pounds. Easily operated and cleaned. No danger of salting subsequent samples. Makes the operation of sampling an easy one; and all competent assayers know that to obtain an assay sample by hand requires more trouble and time than is necessary to reduce the resultant sample to the pulp. Diagonally opposite portions are taken each time; and assay samples are obtained with this machine in less time and with less trouble than by any other method.



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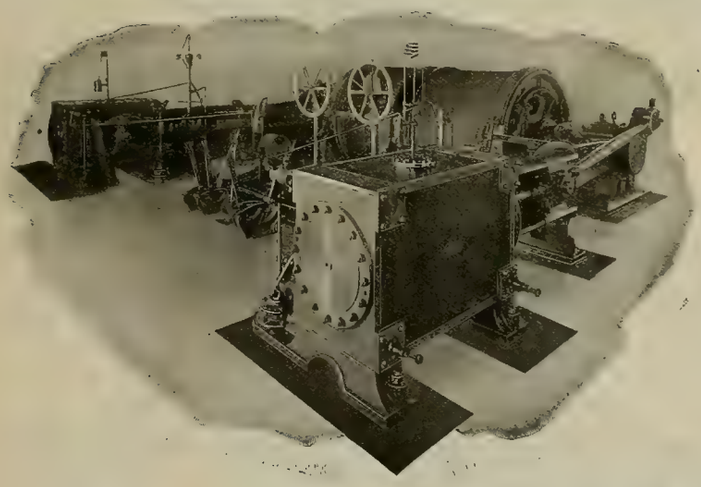


HIGH CLASS FIRST MOTION

HOISTING ENGINES

Especially Designed

For Heavy Duty and Deep Mine Work.

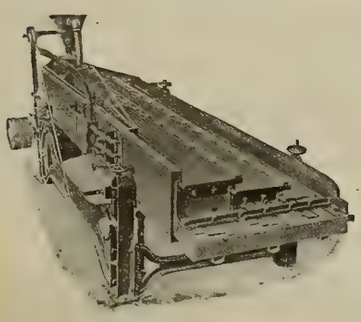
Built with CORLISS OR SLIDE VALVE ENGINES
and for either ROUND OR FLAT ROPE.

Our line of Hoisting Machinery is the most complete carried by any one concern in the United States. Write us of your wants.

THE HENDRIE & BOLTHOFF M'F'G & SUPPLY CO.,

No. 35. DENVER, - - - - - - - COLORADO.

THE IMPROVED BARTLETT CONCENTRATING TABLE.

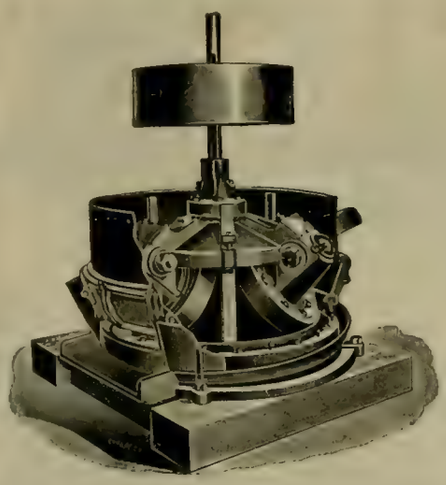


The only table made that will take the place of jigs and do away with costly and complicated machinery.
Especially designed for separating zinc from lead.
Solid Iron Tops, planed to a true surface.
All parts are interchangeable.
Wearing parts reduced to a minimum.
Capacity from 15 to 45 tons in 24 hours, according to class of ore.

Our illustrated catalogue contains all the latest information on the concentration of ores. Mailed on application.

THE COLORADO IRON WORKS CO.,

Established 1860. DENVER, COLO., U. S. A.



THE GRIFFIN
THREE ROLLER
ORE MILL.

The Griffin Three Roller Ore Mill is a simply constructed Mill, suitable for working all kinds of ores that require uniformly fine crushing by the wet process. This Mill is a modification of the well-known Chilian Mill, but the rollers run upon a crushing ring or die, which is inclined inwardly at an angle of about 30 degrees, the rollers themselves also being inclined to the central shaft of the Mill, thus utilizing the centrifugal force, as well as the weight of the rollers themselves as a crushing agent. The Griffin Three Roller Ore Mill is therefore a Mill of great strength, and has few wearing parts. We construct these Mills with extreme care, using only the best of raw materials, which are most carefully worked by men who are specialists as mill builders. We sell the Griffin Ore Mill on its determined merits, and will gladly supply full information regarding it to any one.

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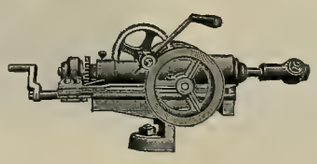

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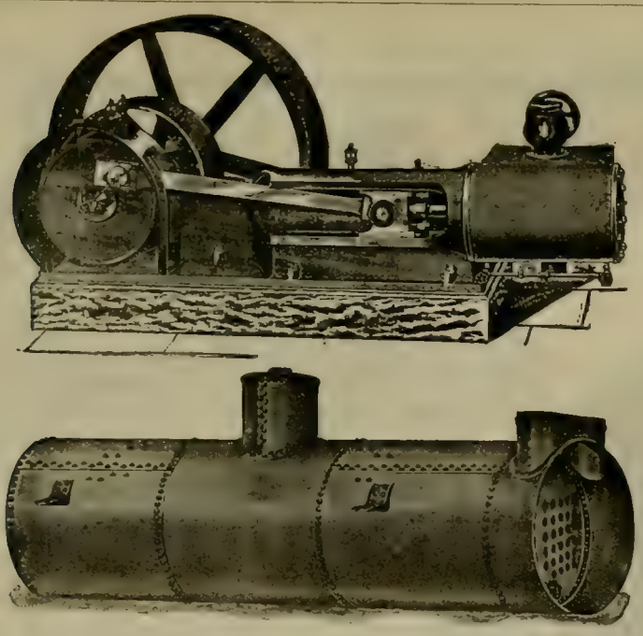

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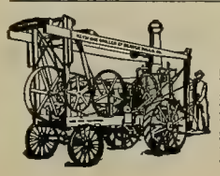

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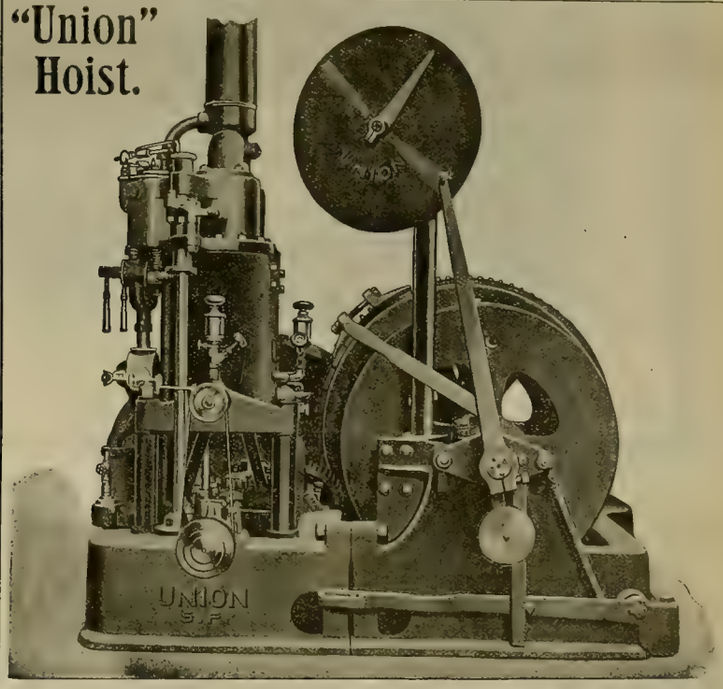

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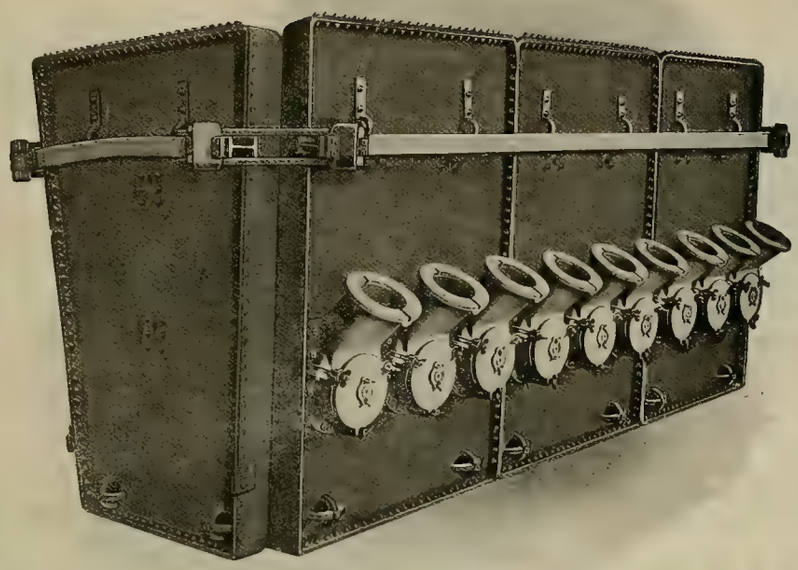

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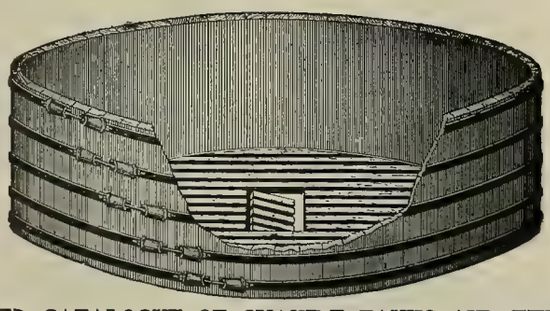

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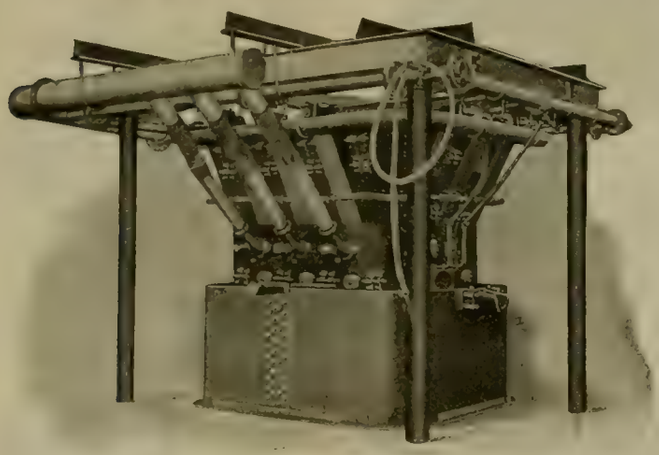

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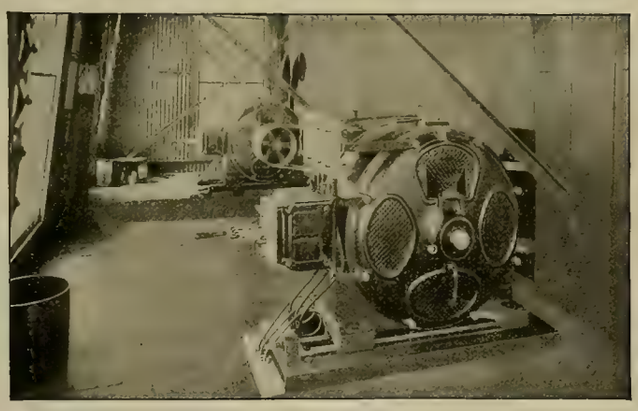

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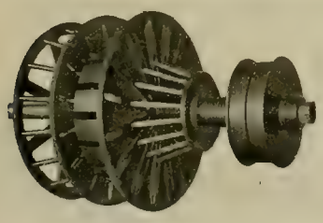

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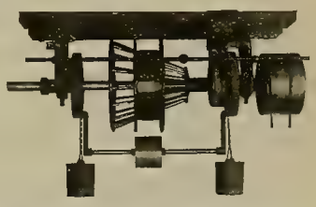

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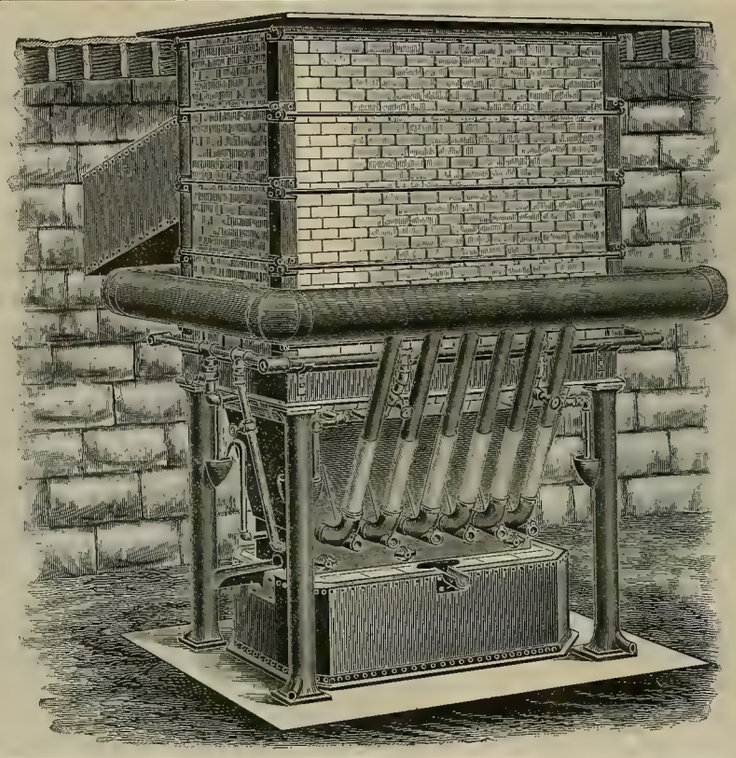

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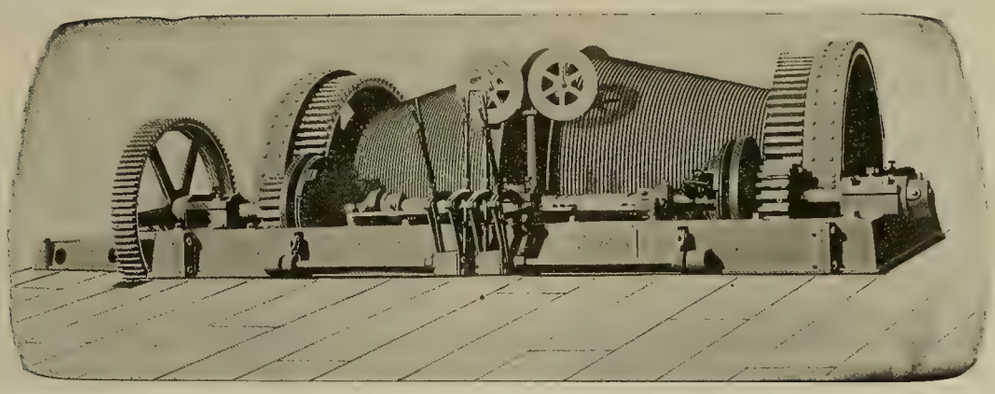

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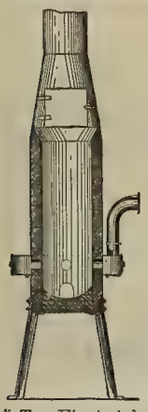

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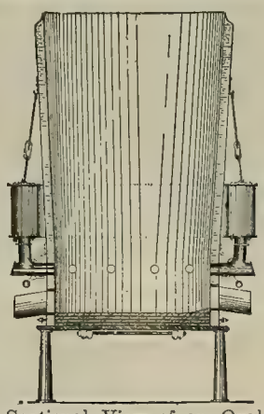

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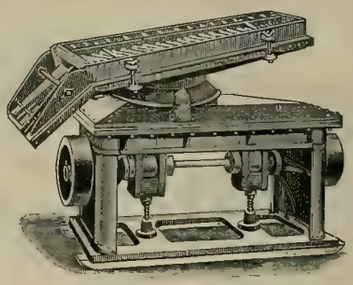

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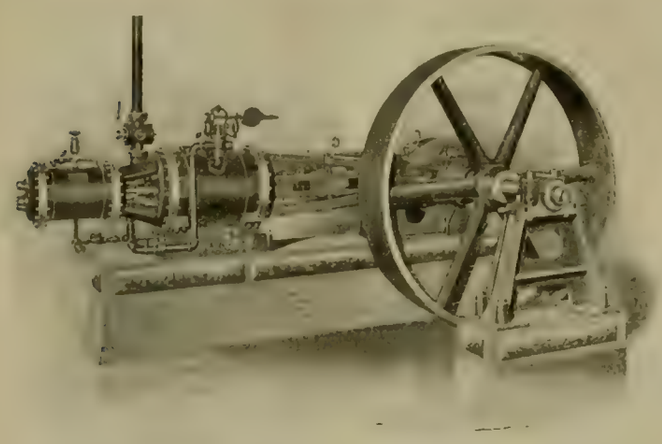

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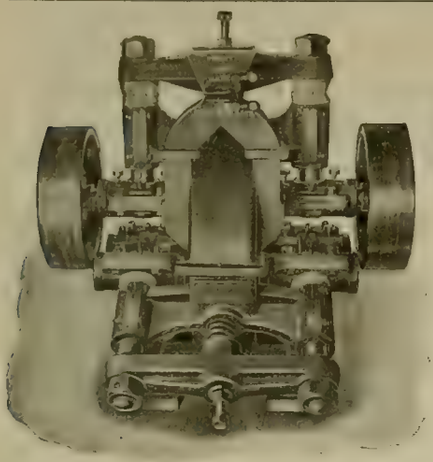

FRONT VIEW OF THE

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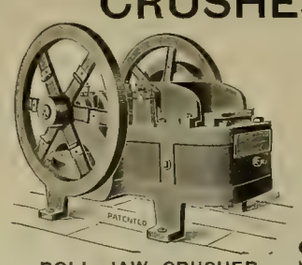

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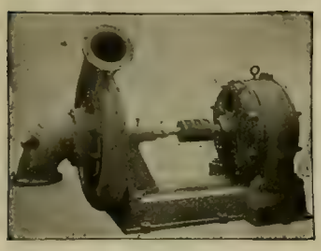

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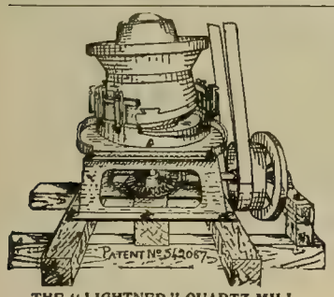

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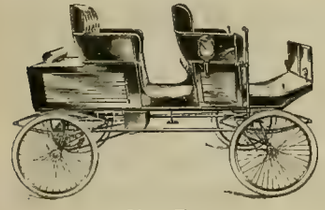

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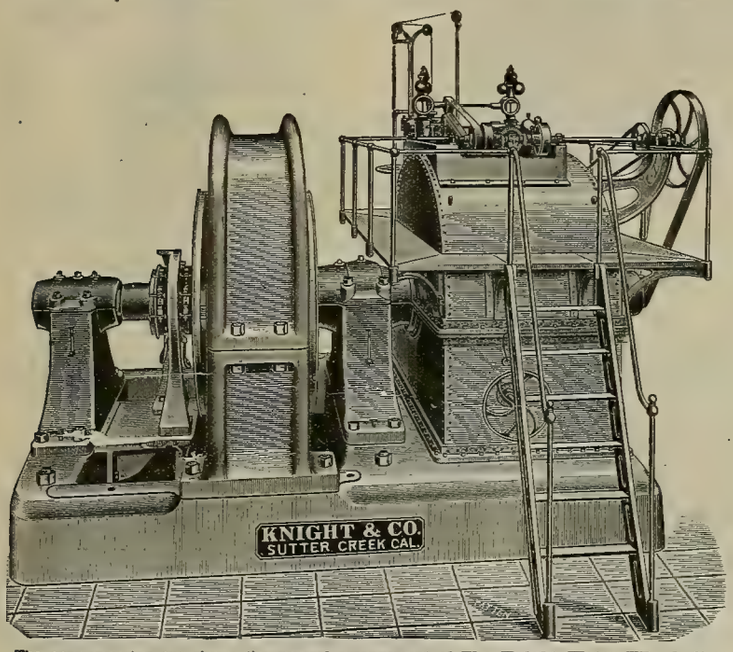

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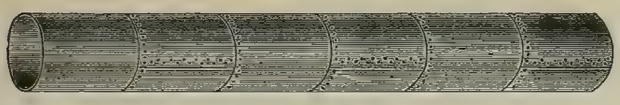

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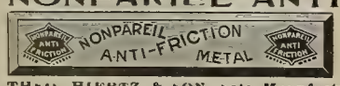

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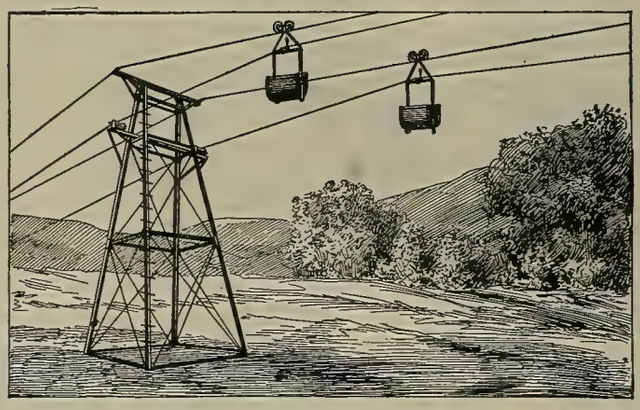

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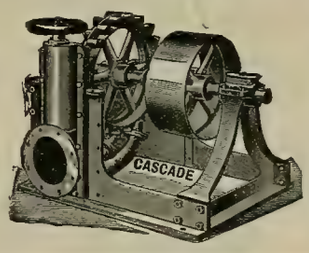

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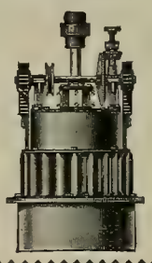

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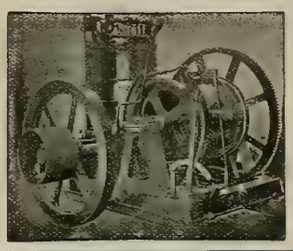

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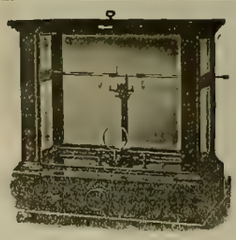

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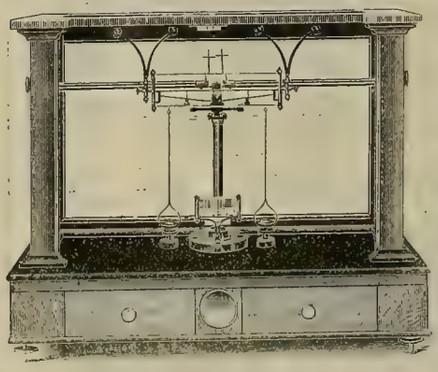

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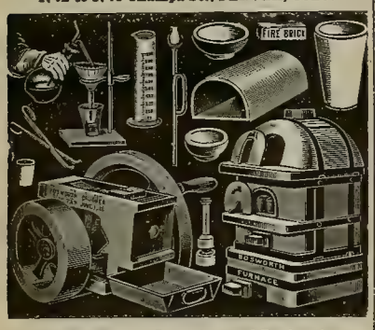

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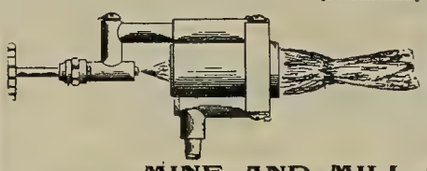

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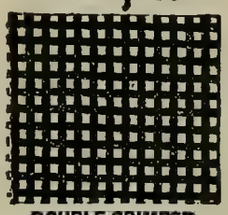

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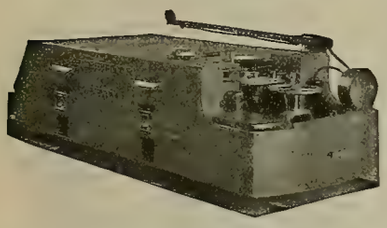

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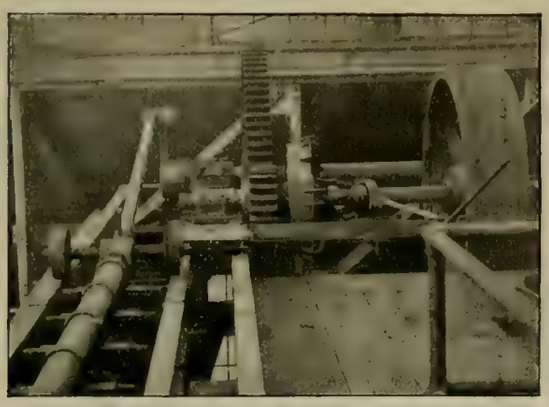

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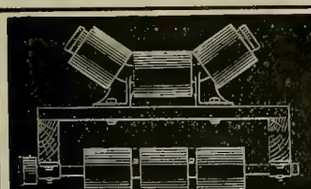

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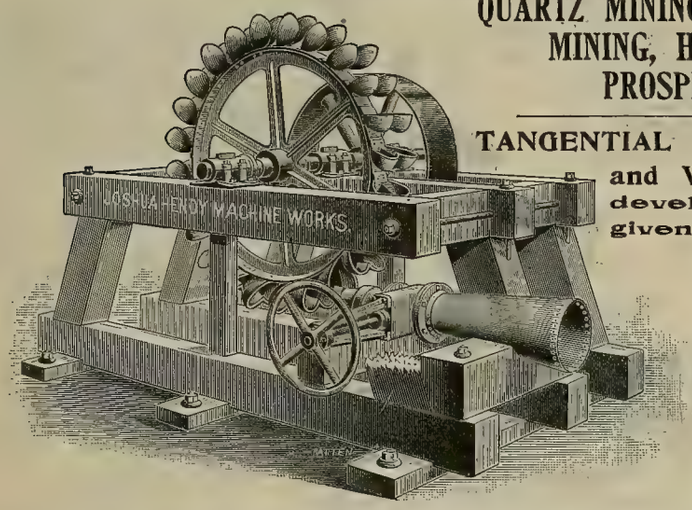

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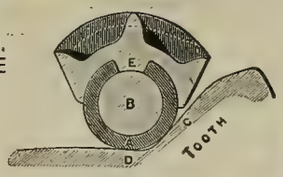

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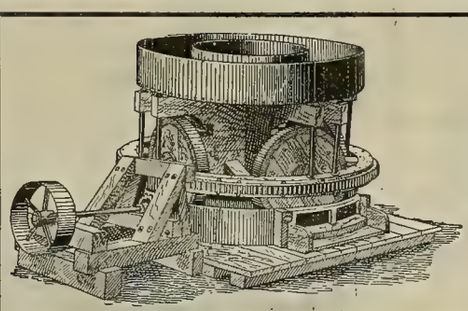

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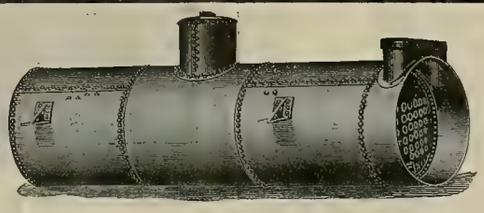

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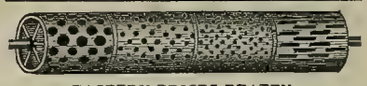

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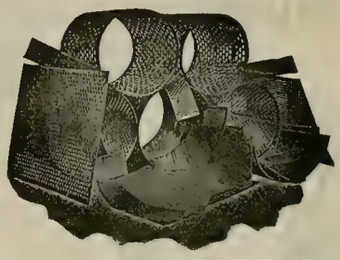

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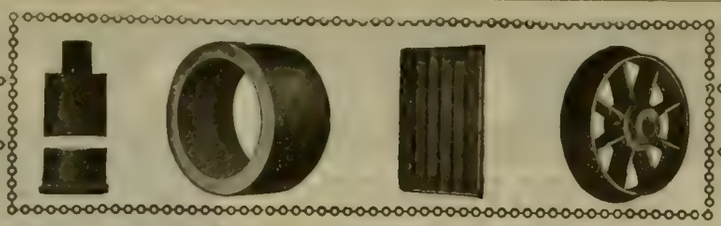
HARD  TOUGH

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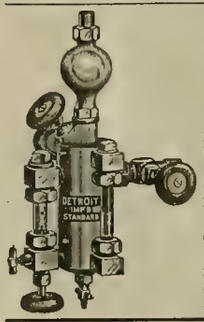

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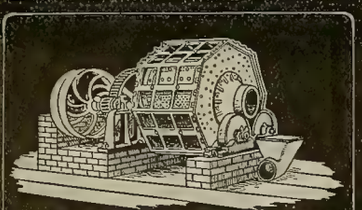

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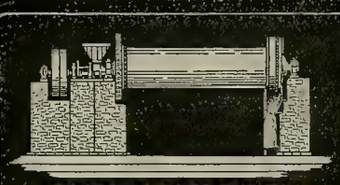

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Office—112 Main street, San Francisco, California

MARIPOSA COMMERCIAL AND MINING COMPANY.—Location of principal place of business, San Francisco, California; location of works, Mariposa County, California.

Notice is hereby given, that at a meeting of the Board of Directors, held on the 23d day of February, 1901, an assessment (No 21) of Ten ($10) Dollars per share was levied upon the capital stock of the corporation, payable immediately in United States gold coin, to the secretary, at the office of the company, 320 Sansome street, room 24, San Francisco, California.

Any stock upon which this assessment shall remain unpaid on the 11th day of April, 1901, will be delinquent, and advertised for sale at public auction; and unless payment is made before, will be sold on SATURDAY, the 4th day of May, 1901, to pay the delinquent assessment, together with the costs of advertising and expenses of sale.

By order of the Board of Directors.

JOSEPH H. MOOSER, Secretary.

Office—320 Sansome street, room 24, San Francisco, California

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SOUTH SLIGER GOLD MINING COMPANY.—Location of principal place of business, San Francisco, California; location of works, Spanish Dry Diggings Mining District, El Dorado County, California.

Notice is hereby given, that at a meeting of the Board of Directors, held on the 25th day of March, 1901, an assessment (No. 1) of two cents per share was levied upon all the issued or subscribed for capital stock of the corporation, payable immediately in United States gold coin, to the secretary, at the office of the company, 402 Front street, Room 8, San Francisco, California.

Any stock upon which this assessment shall remain unpaid on the 6th day of May, 1901, will be delinquent, and advertised for sale at public auction; and unless payment is made before, will be sold on MONDAY, the 27th day of May, 1901 to pay the delinquent assessment, together with the costs of advertising and expenses of sale.

By order of the Board of Directors.

J. L DANIELS, Secretary.

Office—402 Front street, Room 8, San Francisco, California.

AMERICAN OIL AND REFINERY COMPANY.—Location of principal place of business, San Francisco, California. Location of works, Contra Costa County, California.

Notice is hereby given, that at a meeting of the Board of Directors, held on the 26th day of March, 1901, an assessment (No. 3) of five (5) cents per share was levied upon the capital stock of the corporation, payable immediately in United States gold coin, to the secretary, at the office of the company, Room 323 Parrott building, 825 Market St., San Francisco, California.

Any stock upon which this assessment shall remain unpaid on the 29th day of April, 1901, will be delinquent, and advertised for sale at public auction; and unless payment is made before will be sold on MONDAY, the 27th day of May, 1901 to pay the delinquent assessment, together with the costs of advertising and expenses of sale.

By order of the Board of Directors.

J. C. ANTHONY, Secretary.

Office—Room 323 Parrott building, 825 to 855 Market St., San Francisco, California.

Special Meeting.

OXFORD BETA TUNNEL AND MINING Company.—There will be a special meeting of the stockholders of the Oxford Beta Tunnel & Mining Company, to be held at the office of the company, No. 535 Geary St., Room 111, San Francisco, at the hour of 4 o'clock P. M., on the 4th day of June, 1901 for the purpose of increasing the capital stock of the company from twenty-nine hundred shares of the value of one hundred dollars each to one hundred thousand shares of the value of two dollars and fifty cents each.

W. H. KNIGHT, Secretary.

DEWEY, STRONG & CO. SCIENTIFIC PRESS PATENTS PATENT AGENCY 330 MARKET ST. S.F.

DELINQUENT SALE NOTICE.

ALLIANCE EXPLORATION & MINING COMPANY.—Location of principal place of business, San Francisco, California; location of works, Ophir, Placer County, California.

Notice.—There are delinquent upon the following described stock on account of assessment (No. 3) levied on the 12th day of February, 1901, the several amounts set opposite the names of the respective shareholders, as follows:

Names.	No. Cert.	No. Shares.	Amt.
T. Bielenberg	7	200	$4 00
T. Bielenberg	34	200	4 00
T. Bielenberg	44	400	8 00
T. Bielenberg	73	100	2 00
M. G. Mucovich	9	50	1 00
S. Zenovich	10	50	1 00
F. S. Johnson	17	200	4 00
I. Abrams	30	200	4 00
I. Abrams	31	200	4 00
I. Abrams	70	100	2 00
I. Abrams	126	2 000	40 00
D. Davis	45	400	8 00
D. Davis	71	200	4 00
D. Davis	90	200	4 00
Chas. D. Simon	48	120	2 40
Mrs. P. Herleman	49	100	2 00
H. Seller	61	400	8 00
Cliff J. Graham	62	600	12 00
Cliff J. Graham	102	200	4 00
Emile Hirsch	68	200	4 00
May C. Hoppell	88	250	5 00
Irving Watson	100	400	8 00
Daniel Nevius	101	400	8 00
L. Kalmuck	108	100	2 00
L. Kalmuck	172	5.600	112 00
Albertina Davis	110	500	10 00
L. Hirsch	112	2 000	40 00
F. Misch	127	200	4 00
J. B. Topitz	128	1 000	20 00
J. B. Topitz	129	1 000	20 00
J. B. Topitz	144	1 000	20 00
J. B. Topitz	145	1 000	20 00
J. B. Topitz	146	1 000	20 00
J. B. Topitz	147	1 000	20 00
J. B. Topitz	148	1 000	20 00
J. B. Topitz	149	1 000	20 00
J. B. Topitz	150	1 000	20 00
J. B. Topitz	151	1 000	20 00
J. B. Topitz	152	1 000	20 00
J. B. Topitz	153	1 000	20 00
J. B. Topitz	154	1 000	20 00
J. B. Topitz	155	1 000	20 00
J. B. Topitz	156	1.000	20 00
J. B. Topitz	157	1.000	20 00
J. B. Topitz	158	1 000	20 00
J. B. Topitz	159	1 000	20 00
J. B. Topitz	160	1 000	20 00
J. B. Topitz	161	1 000	20 00
J. B. Topitz	162	1 000	20 00
J. B. Topitz	163	1 000	20 00
J. B. Topitz	164	1 000	20 00
J. B. Topitz	165	1 000	20 00
J. B. Topitz	166	1.000	20 00
J. B. Topitz	167	1,000	20 00

And in accordance with law, and an order from the Board of Directors, made on the 12th day of February, 1901, so many shares of each parcel of such stock as may be necessary, will be sold at public auction at 234 Sutter street, San Francisco, California, on MONDAY, the 8th day of April 1901, at the hour of 3 o'clock P. M. of said day, to pay said delinquent assessment thereon, together with costs of advertising and expenses of sale.

S. GOLDSMITH, Secretary.

Office—236 Sutter street, San Francisco, California.

Annual Meeting.

The Regular Annual Meeting of the Stockholders of the CHAMPION MINING CO. will be held at the office of the Company, 113-114 Crocker Building, San Francisco, California, on TUESDAY, the 9th day of April, 1901, at the hour of 2 o'clock P. M., for the purpose of electing a Board of Directors to serve for the ensuing year, and the transaction of such other business as may come before the Meeting.

Transfer Books will close on SATURDAY, March 30, 1901, at 12 o'clock noon.

B. N. SHOECRAFT, Secretary.

Office—113-114 Crocker Building, San Francisco, California.

Save 15 to 50 Per Cent on Your Water Pipe.

THE SPOKANE Galvanized Wire Pipe Co.

WILL DO IT FOR YOU.

Ask for Pamphlets Telling How.

AN INDESTRUCTIBLE WATER PIPE.

Cheap Irrigation Pipe Also.

SPOKANE GALVANIZED WIRE PIPE CO.

SPOKANE, WASH.

INVENTORS, Take Notice!

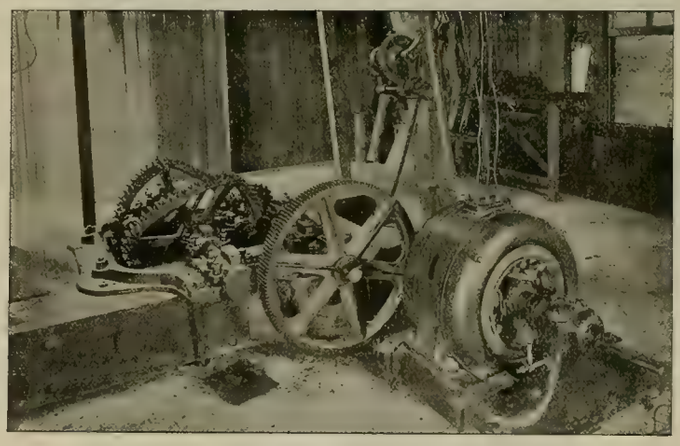
L. PETERSON, MODEL MAKER,

544A MISSION STREET, bet. First and Second Sts., SAN FRANCISCO. Experimental machinery and all kinds of models. Tin and brasswork. All communications *strictly confidential*.

THE

Fulton Pump

can be driven by any kind of Motive Power, but is usually sent from the factory fitted with a Friction Clutch Pulley to be driven by belt.



The above cut shows a No. 3 FULTON PUMP driven by Electric Motor direct connected.

MANUFACTURED AND SOLD BY...

A. T. AMES, Galt, Cal.

THE QUICK ROUTE TO THE EAST

"THE OVERLAND LIMITED"

Via Union Pacific R. R.

Less Than Three Days to Chicago.

Leaves San Francisco Daily at 10 A. M.

PERSONALLY CONDUCTED TOURIST EXCURSIONS LEAVE SAN FRANCISCO EVERY WEDNESDAY AND FRIDAY AT 6 P. M.

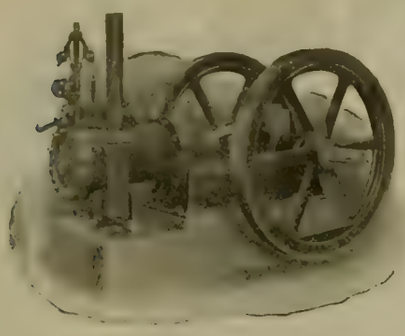
Tickets to and from all Points in Europe by all Atlantic Steamship Lines.

D. W. HITCHCOCK, General Agent, No. 1 Montgomery St., San Francisco, Cal.

THE BRETHERTON HOT BLAST.

APPARATUS FOR PYRITIC SMELTING. It saves fuel, increases capacity of furnace, improves character of work, does not require a hot top causing volatilization like other inventions, furnishes pure air heated without cost, can be attached to furnaces already in use, is an all around money saver, built and used by practical, successful metallurgists. Write for particulars to

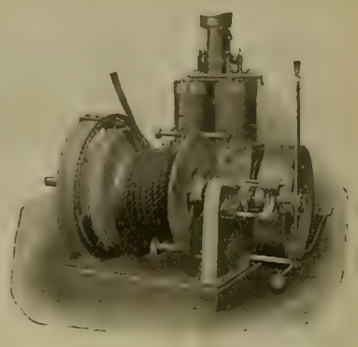
THE BRETHERTON HOT BLAST SMELTING COMPANY, Mining Exchange Building, Denver, Colo.

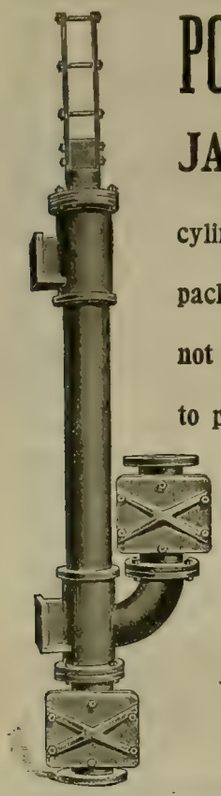


HERCULES stands for the best,

for the most improved — Gasoline Engine. Special attention given to hoists and mill engines for mines. 2½ to 400 H. P. New catalogue Jan. 1st.

HERCULES GAS ENGINE WORKS,
141-143 First St., San Francisco, Cal.





POINTS OF EXCELLENCE
OF OUR NEW
JACK-HEAD PLUNGER PUMP.

Pumps sand and grit without injury to cylinder.

Seldom requires packing and is easily repacked.

Forces water on the down stroke so does not require balanced bob.

Water column and pump rod can be made to perfectly balance.

Each pump is provided with an automatic air valve which relieves pump of air taken in when suction gets out of water.

Combines strength with lightness.

We make a specialty of pumps and would be pleased to forward to you our catalogue.
Send us your inquiries.

W. T. GARRATT & CO.,
Cor. Fremont and Natoma Sts.,
SAN FRANCISCO, CAL.

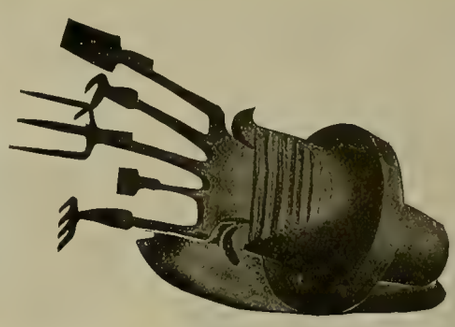
WEBER

E. H. Cook, Supt. United Globe Mines, Globe, Ariz., writes Feb. 24, 1901:

"The 10 H. P. Weber Gasoline Hoist has been in daily use over a year and gives full satisfaction."

Gas, Naphtha, Gasoline. WEBER GAS & GASOLINE ENGINE CO., BOX 1114-I, KANSAS CITY, MO.

SHOES and DIES of SUPERIOR quality and at prices 20 to 30% lower than any other maker. FURNISHED BY ARTHUR KOPPEL, 66 Broad St., N. Y. City. WRITE FOR PARTICULARS.



MINING CARS of every description. PORTABLE RAILWAYS, Rolling Stock, Railway Outfits for Mines of every description. Export Work a specialty. ARTHUR KOPPEL, 66 Broad St., N. Y. City. SEND FOR CATALOGUE AND ESTIMATES.

Pacific Coast Agents, Baker & Hamilton, San Francisco and Sacramento.

ADAMANTINE SHOES AND DIES.
CHROME CAST STEEL.
CANDA Improved Self-Locking CAMS.

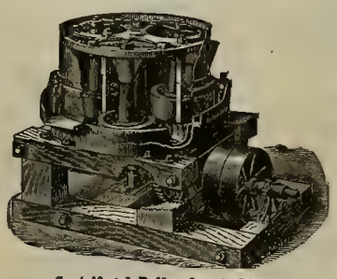
TAPPETS, BOSSES, ROLL SHELLS AND CRUSHER PLATES.

These castings are extensively used in all the mining States and Territories of North and South America. Guaranteed to prove better and cheaper than any others. Orders solicited subject to the above conditions. When ordering, send sketch with exact dimensions. Send for Illustrated Circular.

Manufactured by CHROME STEEL WORKS, Brooklyn, N. Y.

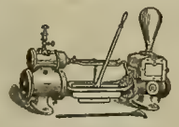
H. D. & H. W. MORRIS,
AGENTS,
Room 194 Crocker Building, San Francisco, Cal.

Canda Cam.

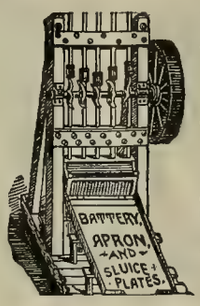


Centrifugal Roller Quartz Mill.

F. A. HUNTINGTON,
—Manufacturer of—
CENTRIFUGAL
Roller Quartz Mills.
CONCENTRATORS and ORE CRUSHERS.
Mining Machinery of Every Description
Steam Engines, Shingle Machines.
Room 1, 3d Floor, Mills Building.
SAN FRANCISCO, CAL.



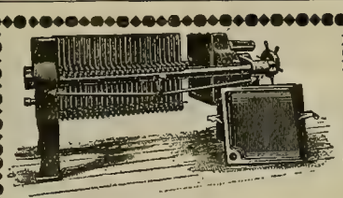
SOLE AGENCY
Worthington Steam Pumps and Water Meters.
Pumping Plants of any Capacity.
TATUM & BOWEN,
34-36 Fremont Street, San Francisco, Cal. 29-35 First Street, Portland, Or.
MACHINERY—ALL KINDS.



Important to Gold Miners
And Manufacturers of Mining Machinery.
Silver Plated Copper Mining Plates,
For Saving Gold in Quartz, Placer and Beach Mining.

The Most Extensive and Successful Manufacturers on the Pacific Coast. Get our reduced rates. Send for circulars. Old plates replated, also bought.

DENNISTON'S SAN FRANCISCO PLATING WORKS,
743 Mission St., San Francisco, Cal. Telephone Main 5931.
E. G. DENNISTON, Prop.
26 Medals Awarded. 35 Years in Business Here.



FOR Removing Slimes
BROMINE
CYANIDE
CHLORINATION
And Other Aquarious Chemical Solutions.
Our FILTER PRESS
Removes all Slimes and Hastens the Deposition of the Metals.
THE STILWELL-BIERCE & SMITH-VAILE CO., 276 Lehman St., Dayton, Ohio. Risdon Iron & Locomotive Works, San Francisco, Cal.; C. B. Boothe & Co., Los Angeles, Cal., Sales Agents.

TELEPHONE MAIN 5303
Union Photo-Engraving Co.
DESIGNING
HALF-TONES
ZINC ETCHING
523 MARKET ST.
SAN FRANCISCO, CAL.

UNION IRON WORKS,

222 Market Street, San Francisco, Cal.

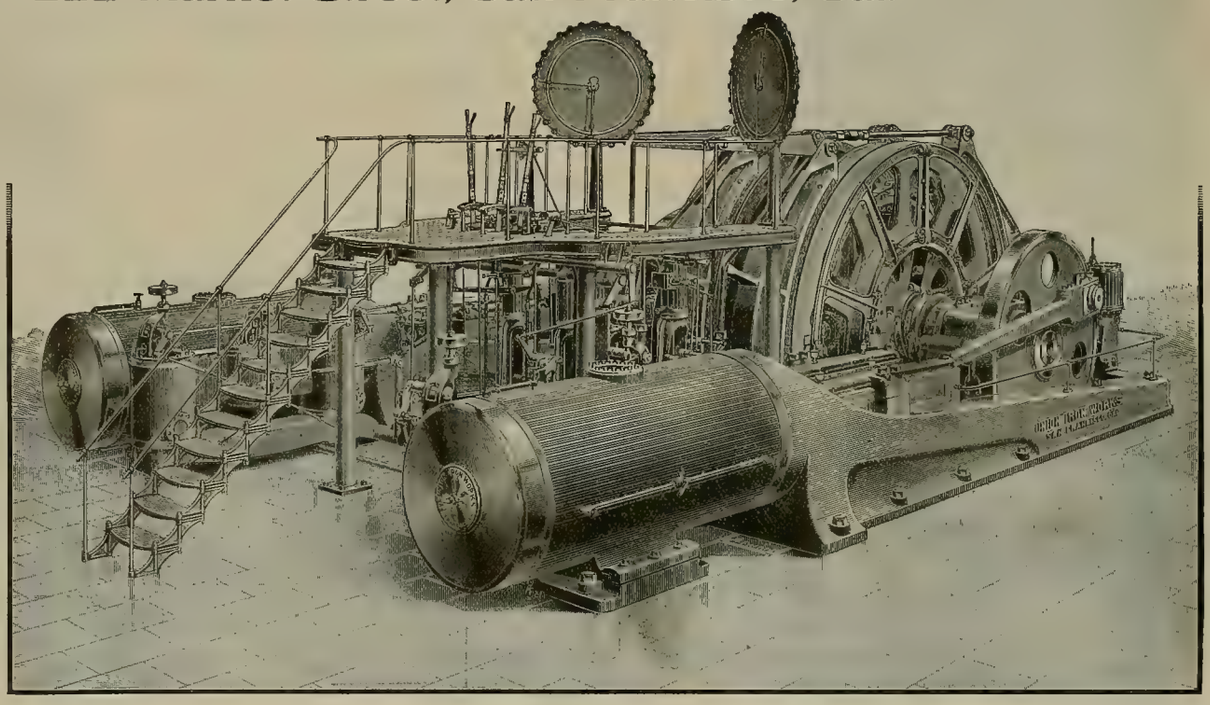
30 in. x 72 in. Direct Acting Hoisting Engine

BUILT FOR THE

Anaconda Copper Mining Company

OF MONTANA.

Embodying all that experience and practical working have demonstrated as valuable in this class of machinery.



The brakes, clutches and reversing gear are arranged to be operated by compressed air or steam, by means of auxiliary cylinders which are under full control of the engineer, stationed upon the elevated platform shown, insuring the most rapid work with absolute safety. Shaft hollow forged steel of ample strength and stiffness to withstand any strains; reciprocating parts of steel and are as light as consistent with the duty required; cylinders of the "overhung" type, weight being taken by a guide saddle, which admits of free longitudinal movement, due to expansion, causing no strain on bed plate or foundations; cylinders steam-jacketed, fitted with valves provided with Corliss releasing gear and hand cut-off, enabling the engines to be run economically with reference to the work to be performed; bed plates modification of the Porter Allen type, heavy and substantial, with large foundation base and anchor bolts. A duplicate of this engine has also been furnished the Homestake Mining Company of Dakota.

THE HALLIDIE ROPEWAY

For Transporting Ore, Fuel, Earth, Sugar Cane, etc., by Wire Ropes.

SIMPLE, ECONOMICAL, PRACTICAL, DURABLE.

LOADS MECHANICALLY. DUMPS AUTOMATICALLY.

WIRE TRAMWAYS (Single and Double Rope Systems),

CABLEWAYS, TRANSMISSION BY WIRE ROPES, CABLE GRIPS, INCLINE PLANES, LOGGING BY CABLES, AUTOMATIC LOADERS,

PLOWING, SCRAPING AND TRANSPORTING by Wire Ropes,

DESIGNED, SUPPLIED AND ERECTED. Estimates Furnished.

AGENCIES: Hendrie & Bolthoff, Denver, Colo.; Scott-Strevell Hardware Co., Salt Lake City, Utah; George A. Lowe Co., Ogden, Utah; P. Basche, Baker City, Oregon.

CALIFORNIA WIRE WORKS, - 9 Fremont St., San Francisco, Cal.

Improved GRIP PULLEY.

Patents Nos. 483,442; 610,353.

EFFECTIVE, SIMPLE, AUTOMATIC.

Saves Wear on Wire Rope and Cable.

Send for Illustrated Pamphlet.

Correspondence Solicited.

MANGANESE STEEL

THE BEST METAL KNOWN FOR

. . . . . .

Stamp Shoes and Dies,
Roll Shells,
Crusher Plates and Side Liners,
Toggles and Toggle Bearings,
Gyratory Cones and Concaves or Liners,
Mine Car Wheels,
Coal Crushing Rolls, Etc.

PARKE & LACY CO., 21 & 23 Fremont St., San Francisco, Cal.

AGENT FOR

KNOWLES PUMPS and PULSOMETER PUMPS,
INGERSOLL-SERGEANT ROCK DRILLS and AIR COMPRESSORS.

CATALOGUES FREE ON APPLICATION.

MINING AND SCIENTIFIC PRESS.

Whole No. 2124.—VOLUME LXXXII. Number 14. SAN FRANCISCO, SATURDAY, APRIL 6, 1901. THREE DOLLARS PER ANNUM. Single Copies, Ten Cents.

Half-Tones and Illustrations.

Some business men do not properly understand the making and use of half-tone cuts for advertising purposes. It is possible, frequently, to materially improve photographs sent in for half-tones, by painting and retouching. Figures can be strengthened, backgrounds changed to give contrast, obstructions removed, signs painted in, effects heightened or subdued. Photographs that it is necessary to thus alter should be something larger than the cut to be made from them. Changes made on them are thus less apparent when they are reduced to the required size. Work of this kind is charged extra for the time put on it. It is impossible to get photographs for many subjects that it is desired to illustrate by half-tone process. Wash drawings are made to take the place of the photograph. A smooth-finish drawing paper is used, and the design is worked up in sepia to look as much like a photograph as possible. To obliterate all brush marks, the design is made two or three times as large as it is intended to have the finished cut. In the reduction, all the imperfections are lost.

The engraving of the new shipbuilding plant of the Risdon Iron Works of San Francisco on this page is an example. A wash drawing was first made. This cost $75. It was about three times as large as the half-tone herewith. Considerable money is now spent on engraving for advertisements. The original of the picture of the stamp mill in the advertisement of the Union Iron Works of San Francisco, on page 2, cost $100. The two pictures in the advertisement of F. W. Braun & Co. of Los Angeles, Cal., are good examples of handsome illustration. Another advertisement that cost considerable for engraving, etc., is that of the Edward P. Allis Co., Milwaukee, Wis., on page 9. Wood cuts are also used. The picture in the advertisement of Fraser & Chalmers, on page 11, and the entire advertisement of the John A. Roeblings Sons Co., on page 8, were made from wood cuts. The small cut in the advertisement of the Hooper Pneumatic Milling Co., on page 11, is also from a wood cut. That illustration was engraved on wood for this office, and an electrotype taken for use. To use the original wood cut would soon dim its clearness and sharpness of outline; but an electrotype from a wood cut can be had at small cost, and gives as good an impression as the original. Photographs and wash drawings are frequently worked in combination. It is the usual method employed in handling groups. The photographs are arranged on a background and decorations, lettering, etc., are put around them on the background, and a half-tone made of the whole. The engraver gets a good deal of criticism that should go elsewhere. Fine half-tones must be printed on good paper to get good results, and they must have good presswork. Don't get fine half-tones for a book or trade catalogue unless you use good paper and pay for having the printing properly done. If the job is a fine one, use enamel paper or sized and super-calendered stock, and go to a printer who has good workmen, good machinery, and takes a pride in his work. If these facilities are not at hand, get coarse half-tones, line etchings or wood-cut electrotypes instead of half-tones.

Vignetting means the cutting away and softening the edges of a half-tone. Material improvement and beautiful effects are possible from vignetting on many subjects. The work is done by hand with a tool after the cut is otherwise finished. The time required in doing it is an added expense to the otherwise price of a square finished cut. A sharp vignette is where all background is cut away. This is used on portraits and machinery to make the subjects stand out in high relief. Soft vignettes are where portions of the background are left on and the edges softened off. Vignettes are more difficult to print with good effect than square finished half-tones, and should only be ordered where they will have careful attention in printing. The advertisement of the California Electrical Works—the Gardner electric rock drill on page 16—is a good example of vignette work. The picture in the advertisement of the Best Manufacturing Co., San Leandro, Cal., on page 2, is a good example of a fair quality half-tone from a photograph direct. The more work put on a half-tone the better it looks, and the more it costs. Ten dollars' worth of extra work can be put on a $10 half-tone, but for fine work such expense is necessary. There are many other handsomely illustrated advertisements in this issue equally deserving of notice, and that given to those specified is not invidious mention, they being referred to as typifying the kind of portraiture under discussion. This article is merely in general answer to inquiries on that subject constantly received.

Half-tones can, in many cases, be materially improved by hand tooling, after the cut is finished in other respects. The cut goes to an expert workman, who goes over it as he would a wood cut and lines up portions of it to make it lighter, or burnishes other portions of it to make it darker. The effect is something like a wood cut. The method is largely used in fine illustration and is largely responsible for the popularity of half-tones for the higher grades of illustration. Hand tooling and vignetting are largely employed, also, in fine catalogue illustrations. It is rarely satisfactory to take an electrotype of a half-tone. The process does not do the original justice; and the delicate lights and shades, the tones and half-tones that make this form of engraving so deservedly popular in magazine and newspaper work cannot be successfully reproduced in the electrotype from the plate, and require excessive care in the printing to be even approximately satisfactory.

New Shipbuilding Plant of the Risdon Iron Works, Potrero, San Francisco, Cal.

MINING AND SCIENTIFIC PRESS.

ESTABLISHED 1860.

Published Every Saturday at 330 Market St., San Francisco, Cal.

ANNUAL SUBSCRIPTION:

United States, Mexico and Canada.....$3 00
All Other Countries in the Postal Union..... 4 50

Entered at the S. F. Postoffice as second-class mail matter.

J. F. HALLORAN.....Publisher

Special Representatives:

EASTERN.

E. H. HAVEN.....150 Nassau St., New York City.

MIDDLE WEST.

CHAS. D. SPALDING.....153 La Salle St., Chicago, Ill.

INTER-MOUNTAIN.

W. A. SCOTT.....43 Jacobson Building, Denver, Colo.

SOUTHERN CALIFORNIA.

W. D. CURTIS.....223 W. Second St., Los Angeles, Cal.

San Francisco, April 6, 1901.

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DURING the early part of this year Prof. Black of New Zealand made some practical experiments of his permanganate process in the treatment of gold ores at the Lightner mine, Amador county, Cal., a modification of or a substitute for the chlorination process. A technical account of the operation, written for this paper by Dr. Henry Norman, appears on page 167. Thus far, theoretically, 948 parts permanganate of potash are required to dissolve 1568 parts gold. In experiments with well roasted Mt. Morgan concentrates carrying an undetermined quantity of copper, the consumption of permanganate was .2 pound per ounce of gold dissolved, or 2 pounds per ton of roasted ore treated. The Amador county experiments as related give somewhat different returns. As permanganate is the most expensive ingredient in the treatment, the amount necessary in ore treatment will largely determine the commercial value of the process, it being granted that that chemical is efficient therein.

INASMUCH as it was the articles in this paper that largely started the present furore in oil in California, it feels in a measure some responsibility in the matter and dislikes to see such flaming misstatements as appear in many advertisements in many papers that ought to know better. Eastern publications are especially guilty of lending their columns to such misrepresentation. The truth is good enough, and as a cold matter of business it will pay better in the long run or the short run to stick to the facts. In many of these advertisements the facts are greatly exaggerated. Take, for example, the "Eastern Star," which is doing considerable advertising. It announces itself as "the greatest and most productive oil company in California." It asserts that it has extensive holdings in the Kern River district and also "in southern California." Statement is made that it has 660 acres in Kern River district, and, altogether, 1560 acres, 600 of which are in the "rich Kramer district." The company is capitalized at $2,000,000. Now, regarding Kern county, the company owns twenty acres proven land on Sec. 29, on which two wells are completed. It owns part of Sec. 3, which is not proved territory. Say its twenty proved acres are worth $5000 per acre, or $100,000, would make its stock value, if figured on the base of its proved Kern county territory, five cents per share. As for the "rich Kramer district," there is no oil well there as yet. This is a case of a company with some merit that exaggerates and misstates. As for the bare frauds and wildcats, their name is legion, and bear the same relation to legitimate oil mining that camp followers do to an army.

Supplying Mining Machinery.

The matter and manner of buying mining machinery is always of consequence. Communications on this subject complain of common grievances: one, that the consulting engineer had considerable work done by the firm to whom the bid was proffered without any result beyond expense to the manufacturers; another, that the intermediary placing the business, though manifestly paid by his employers—the mining company—subsequently expected a percentage from the manufacturing concern to whom the bid was awarded, although in his request to them for figures it was distinctly stated that he wanted net prices. In each case the work was of considerable amount. It is only where the proposition is of some magnitude, running away up into the many thousands, that those matters are given much attention, and in no case can anything be said except in the most general way, as those matters are largely left to conditions of a local and individual nature, and can hardly be made the subject of special discussion. There is not much of settled custom or habit, though, ordinarily, in large works, after the responsibly financial firm determine what they want, they usually get expert advice as to how and where their orders shall be placed. This rule prevails more in mechanical engineering than in mining engineering, and more in mining engineering than in civil engineering. In some engineering work the custom is gaining of giving the work of engineering, the design and the contract for construction to the same engineer, and out of this is growing the custom naturally for mining and mechanical engineers to associate themselves with manufacturing or contracting corporations. Then, too, there is a growing tendency of big buyers to place responsibility of design and construction in a concentrated way by putting big jobs into the hands of contractors, who first design and then construct to their own designs and specifications. Of course, in all this the individual is prominent—that is, the individuality of the man. The possibilities of competition do not always embrace guarantee of accuracy and quality, which must necessarily result in its highest degree from a concentrated and interested responsibility.

In this, as in many other cases, whatever secures the best all-round results is good business. Whether it is right for an engineer to reject the lowest and best bids; whether it is proper for an engineer, who is being paid by his employers to get good material at lowest prices, to ask a bonus or percentage from those with whom he places the order, is largely a matter of individual ethics or morality or conscience. Certain it is that it is becoming customary now for engineers not only to specify what shall be bought, but to make purchases themselves, the engineer occupying toward the company the relation of purchasing agent, to get his commission from the concern that he was working for, and not to be supposed to take any commission from anyone else who had dealings with him. If he were in position to make the best trade, to know the merits of each article to be purchased, he could make himself of value. Of course, the contractor who would also be the engineer, if working on percentage on purchases, might have undue temptation to overdo the whole thing. The business relations existing between a big purchasing concern and such a purchaser for them would naturally be on the high plane of personal confidence. The man or men who want to buy a big mining plant, who want the best and get it for the least money, will go about it in different ways, and the men who pay the money usually have their own way about it. No mining machinery manufacturer wants to bid too high or too low on a good contract, nor does he care to give a whole lot of detail, planning, designing, and supplying what may be styled office and architectural work at considerable expense, unless he knows his men. In this regard it is common for a mining machinery concern to tell whoever is asking for plans or designs or special work regarding a proposed plant that they will take the matter up and furnish what is required in the way of preliminary designs, etc., with the explicit understanding that, if they get the work, it is not to be counted, but, if they do not, they will make a reasonable charge for their services in the direction asked. The biggest buying concerns now handle all these things in their own way. For instance, Calumet & Hecla people have one man, Mr. Leavitt, who does all their engineering, designs every detail of pump, or stamp or motor, and has everything to the smallest piece built to order. Other companies contract for the work done with a man or men who agree to do it for cost plus a certain percentage of profit, though this latter is manifestly open to the temptation of increasing the cost of labor to proportionately increase the profit of the 10% or 15% thereon, as in the case of one contractor of that kind who had an unnecessary building erected and then taken down and rebuilt just for the sake of the 15% he got on the cost thereof. In ordinary purchases such matters as are here briefly referred to do not enter, and where there are big contracts there is no settled manner of procedure, though it is manifest that the consulting engineer is getting more closely in touch with manufacturing establishments everywhere through the growing realization of the necessity of the common interests that the best results may be obtained at the least cost commensurate with quality. In general it were well to eliminate so far as possible the middleman; when principals get together things move much easier. There are always different ways of doing things and different people who believe that some ways are better than others. The best ways succeed; the others fail. In this, as in all other kindred things, experiment and experience and brains are gradually working out the best solution of the problem.

In ordinary transactions where mining apparatus of any kind is wanted the prospective buyer can safely and economically consult any reputable manufacturing firm who have in their constant employ some competent man fully conversant with needs and requirements, and who can intelligently commend or suggest what to get. If he be told just what is needed, what the particular surroundings are, what it is expected the machinery must do, he can give advice that will be worth considerable to the buyer.

Honesty underlies all transactions, and it becomes, after all, a question of the integrity of the individual man. But there are two kinds of honesty. A man may be of the strictest integrity, unapproachable and unbribable, but there is another kind of honesty which neither deceives itself nor anybody else, and which takes no risk on account of others because of its own possible ignorance. It is also to be noted that some men have talents more in the way of being advisory; they can better tell people how to do things than they could do those things themselves, and very often their advice is good and productive of money saving and money making. Others are destitute of this quality, but can do things and do them well. It is also to be borne in mind that nearly all of us have some one specialty and that no man is all-round complete. It takes several working together to do a thing right; one can take the whole thing and do part of it well, and the rest not so well. Because of this result organizations of men to do so many things which one man can not do, but which must be done and which need to be done together, in the meantime it being necessary to have some one man who has the final say and with whom rests the financial and moral responsibility of the whole thing. The man who can do things is usually the man to whom is given things to do; the man who has demonstrated his ability to make money and save time for others will usually have his way, and the manufacturing concern that has demonstrated ability to make good machinery is rarely at a loss for appreciative customers who are willing to pay good money for good work.

This is necessarily fragmentary and without absolute or clear-cut conclusion, and is largely of random thought suggested by the widening horizon and the many conditions in the complex problem.

THE California Supreme Court in a Tuolumne Co. case has decided that the owner of a ditch right of way across another's land cannot substitute a pipe line for the ditch without the consent of the land owner. The decision is of importance, for as water becomes more valuable there is a natural tendency to avoid wasteful losses from ditches by substituting pipes, particularly where opportunities offer for the development of power.

CANADA is determined to exclude alien labor; the Dominion parliament has passed a bill making it impossible for any Canadian employer in mine or mill or other work to engage the services of any one not a British subject. It is an arbitrary measure, a backward step, an unwise effort, and will not prevail.

Concentrates.

PRESENT United States monthly shipments of silver are about 3,000,000 ounces.

AT 32° F., 1 cubic foot of water weighs 62.42 pounds; at 100° F., 62.02 pounds; at 212° F., 59.76 pounds.

CHEMICALLY PURE MAGNETITE contains 72.4% iron; magnetite ore carrying over 50% iron is high grade.

TO CUT a bottle fill it with oil up to the line at which it is to be cut, make an iron rod white hot, and dip it into the oil.

EXPORTS of refined petroleum from the United States represented in 1898 a value of $51,242,933; in 1900, $67,740,106.

A SAND SLUICE should have a grade of 3½ inches to every 16½ feet; a blanket sluice should have a grade of about 3 inches in 7 feet.

THE United States Geological Survey reports the 1900 production of spelter in this country to have been 122,116 short tons; in 1899, 119,407.

"ABSOLUTE ZERO" is considered to be—273° C.; liquid hydrogen boils and volatilizes at—240° C. under ordinary atmospheric pressure.

THE daily capacity of the smelter at Northport, Wash., is about 1300 tons; of the Trail, B. C., smelter, 800 tons; and of the Hall Mines, 300 tons.

TELLURIUM is soluble in sulphuric acid, giving a red solution, from which a blackish-gray powder of tellurium is precipitated by diluting in water.

STEAM at atmospheric pressure flows into a vacuum at the rate of 1550 feet per second, and flows into the atmosphere at the rate of 650 feet per second.

ORDINARILY, with a diamond drill, hand power, 1⅜-inch bit, 15 feet per day may be drilled in medium rock, which would make the minimum cost about $1 per foot.

A "CORD" of ore, as the term is used in Colorado, is a quantity in weight varying from six to eight short tons. It is ordinarily used to measure ore that is treated in a stamp mill.

ONE-SIXTEENTH of an inch of scale on the inside of a boiler will reduce the conductivity of the sheets about 15%; one-sixteenth of an inch of soot on heating surfaces reduces conductivity 15%.

CHILE now produces about 21,000 tons of copper annually. Most of the ore is exported; the Chilean copper works are not very active at present. Want of means of transport is one cause of such depression.

GARNET is found in abundance in Alaska and more sparingly in North Carolina and Pennsylvania. As an abrasive, corundum and emery lessen the demand, though as a gem fine specimens are of value.

SATURATED STEAM at a pressure above zero of 150 pounds per square inch has a temperature of 361.76° F., latent heat 857.98 B. T. U.; a total heat above zero of 1224.28 F., B. T. U., and 1 cubic foot weighs .3466 pound.

CLAYS, and, in general, alumina compounds do not tend to form scale in steam boilers; carbonates, and sulphates of lime and magnesium do. Free sulphuric acid does not form scale, but corrodes the boiler plates and tubes.

BLUE-PRINT PAPER with usual coating requires an exposure of from four to eight minutes in bright sunlight. A quick-printing blue-print paper is furnished, in which the exposure is completed in from one and one-half to two minutes.

IN an inclination of 100 feet in 100 feet corresponding to an angle of 45°, a load of 2000 pounds will produce a strain on the rope of 1419 pounds; and for a load of 9000 pounds the strain on the rope would be $1419 \times 9000 \div 200 = 12,771$ pounds.

THE idea of the Shasta, Cal., miner that medicine chests made up with special regard to miners' needs be prepared for sale in different mining camps, particularly isolated ones, is good, but not new, and might in some cases be of practical value.

AN electric meter should be in a position insuring the minimum of vibration. An extremely hot or damp location should be avoided and places subject to steam or chemical fumes, such conditions tending to reduce its durability and satisfactory operation.

BLACK FLUX is prepared by gradually introducing in small quantities into a crucible heated to a dull redness about 1150° F.) a mixture of two parts cream of tartar and one of niter. Some prefer to have the mixture made of equal parts cream of tartar and niter.

IN California 3.6 barrels fuel oil is considered equivalent in heat power to one ton anthracite coal. San Francisco can consume 250,000 barrels per month. The present price of oil at Bakersfield, Cal., is 25 cents per barrel; at Los Angeles, 75 cents; at San Francisco, $1.

CUSTER CO., MONTANA, has 20,490 square miles, San Bernardino Co., California, 19,947; Lincoln, Nevada, 19,437; Coconino, Arizona, 19,322; Nye, Nevada, 17,376; Choteau, Montana, 16,049; Socorro, New Mexico, 15,386. The largest county in Texas is El Paso, 9,353 square miles.

ACCORDING to the law of flow of gases through an orifice, the flow increases as the square root of the increase of pressure. Hence, a blower having no grease or packing on the working surfaces, and working under a pressure of fifteen pounds per square inch, would leak 3.872 times as much as it would when working under one pound pressure, provided the machine is constructed so rigidly that there is no more spring of the parts at fifteen pounds than at one pound.

A SINGLE leather or three-ply rubber belt traveling 100 feet per minute, at ordinary tension, will transmit power proportionate to its width. It is calculated that a belt 3 inches wide will so transmit .34 H. P.; a 5-inch belt, .66 H. P.; an 8-inch, 1.06 H. P.; a 12-inch, 1.6 H. P.; an 18-inch, 2.4 H. P.

THE postoffice department at Washington has changed some of the names in the State of Washington—"Spokan" in place of Spokane; "Lake Kootenai" for Lake Kootenay; "Pend Oreille" for Pend d'Oreille; "Clealum" for Cle-Elum; "Sanpoil" for Sans Poil, and "Okinagan" for Okanogan.

THE west coast of South America has been pretty well exploited by Spanish, American and German miners. On the eastern slopes of the Andes on the confines of the Argentine Republic is a newer mining field, and one that may be opened up by American miners, as it is now connected with Buenos Ayres by rail.

THE Oregon Legislature has amended the mining law of that State by requiring prospectors to stake claims within thirty days after posting discovery notices. They are also required to sink a 10-foot shaft or dig a 10-foot tunnel within sixty days after posting notices. The fee for recording with the county auditor remains at $1.

NITRO-GLYCERINE is made by spraying ordinary glycerine into a vessel of mixed nitric acid and sulphuric acid in the proportion of two parts sulphuric acid to one part nitric. The glycerine instantly combines with the acids and floats to the top, whence it is skimmed and washed until all the free acid is taken from it, when it is a merchantable commodity.

REGARDING the commended use of ground glass as a flux for cyaniding slimes, as noted in last Saturday's issue, borax-glass and silica are also used for fluxing gold slimes with satisfactory result, in the following proportions: dried gold slimes 10 parts, borax-glass 4 parts, silica 2½ parts, forming a liquid slag, from which the gold settles readily.

A DOUBLE REEL HOIST, first motion, with capacity 1500 feet rope, would have approximate dimensions: Reels 48 inches center diameter; 10 feet diameter of arms; 5 inches wide; rope ⅝x4½ inches; engine 80 pounds boiler pressure, 20x48 stroke; 75 revolutions per minute; load 8000 pounds, exclusive of rope. The shipping weight of above would be about 108,000 pounds.

MINERALS of low magnetic permeability can be cheaply made more magnetic by gentle heating in a non-oxidizing atmosphere. In the Wetherill magnetic separator the separation is largely made possible by the use of powerful electro-magnets so arranged as to produce a magnetic field of great intensity. By its use spathic ore is susceptible of separation from zinc blende and brown hematite from calamine.

THE circumference of a circle multiplied by 0.282 equals the side of a square of the same area; the contents of a round tank can thus be compared to that of a square tank. A round tank 4½ feet diameter holds 103.03 U. S. gallons for each foot in depth; one 11 feet diameter holds 710.6977 gallons for each foot in depth. A gallon of distilled water at 39° F. weighs 10 pounds; a gallon of pure alcohol, 7.9 pounds; benzine, 8.5.

THE late Montana Legislature has changed the laws relating to mining locations in that State. By the law as it now stands, work must be done within sixty days (old law ninety days) after location. The locator, if he makes a defective location or desires to alter the boundaries of his claim, is now permitted to file an amended declaratory statement, provided it does not conflict with intervening rights of other locators.

IN air compressor practice the air pressure required has been constantly increasing; in many up-to-date compressed air applications, 100 pounds steady working air pressure under full speed is considered essential to the attainment of satisfactory results. The adaptability of application is so extensive that it is ultimately economical in many cases to provide a compressor of 50% greater capacity than immediate necessity or original intent may seem to demand.

PRISMATIC COMPASSES permit of observing the magnetic azimuth of objects not in the plane of the observer, and are more accurate than others (except the regular surveyors' compasses), because by means of the prism the vertical hair of the sight-vane appears directly continuous with one of the divisions. The object, by means of the vertical hair, is vertically projected to the plane of observation, so that angles are observed in one plane, like they are laid down on a map. Their accuracy can be increased by repeating the observations, and taking their mean, or by back-sighting.

IN no Arizona copper refining works are remelting furnaces now used. At the Copper Queen the matte, made from a mixture of oxidized and sulphuretted ores in cupolas of 120x42 inches at the tuyeres, is discharged into large wells mounted on rollers, and rotated like the converters by hydraulic machinery, one well in front of each furnace. From these wells the slag flows continuously; the matte is poured directly into the converter, on a lower level. The tilting well was adopted because of the difficulty of controlling the flow through a tap-hole directly into the converter from a deep receptacle holding so many tons of matte. To remedy the defects of the plan each furnace is provided with two wells in tandem. An electric crane moves the matte from any furnace well to any converter, and lifts the converter slags and pours them into one of the wells nearest a furnace stack. In the new works at Nacosari, Sonora, Mexico, the well is placed to the side of the furnace instead of in front; it can be tilted to the rear as well as to the front, and so when it has to be emptied of matte the supernatant slag can be poured off to the rear.

THE American Smelting & Refining Co. are credited with an intention to reduce treatment charges at their Colorado works. They are stated to be remodeling plants and installing automatic machinery, cutting down losses and reducing the amount of labor. If these improvements, cheapening costs, result in materially reducing the treatment charges, the mining of many of the low-grade ores of Leadville and other districts will be possible, and a largely increased metal output will result. It is expected that ore yielding only $10 a ton will, with the reduced charges, pay a profit.

THERE is nothing in "law" as "law" to aid or deter a miner, and the miner who takes newspaper law as a guide will never do much. True he may "make no mistakes," but he will not be likely to make anything else, and the man who never made a mistake, besides being lonesome, never amounts to much. After all, the "law" is only a collection of memoranda, and a miner needn't worry much over not knowing what was the latest idea in the mind of some judge who thus gave a court a majority decision upsetting some former ruling. Less than half of those who make a business of knowing all about law succeed, for one-half the lawyers in every trial get beaten.

A CONDENSING engine would require about twenty-five times the amount of feed water for condensing purposes: from 1 to 1½ gallons condensing water per minute per indicated horse power. A surface condenser for a compound steam engine would require about 2 square feet of cooling surface per horse power; an ordinary engine would need more surface according to its economy in the use of steam. To insure satisfactory result the air pump must be set lower than the condenser. With a good air pump and condenser there should be secured 25 inches of vacuum, which would render available about ten pounds more mean effective pressure with the same terminal pressure.

WHERE the crucible method does not wholly give satisfaction in assaying scorification should insure accurate results. In a circular, shallow, fireclay dish 2 inches in diameter is put one-tenth of an assay ton of pulp, mixed with twenty grammes chemically pure test lead, a similar amount of the latter added and a small quantity of coarse-grained borax, the charge placed in the muffle and the door closed until the operation is well under way, when it will be noticed that the melted metals lie in the center of the scorifier, a glowing mass, surrounded by a ring of melted slag. After this latter has completely closed over the metals the assay is poured into a mould, the slag removed and the lead button cupelled.

AFTER sylvanite, or graphic tellurium—the most widely distributed of the gold-bearing telluride minerals—calaverite and petzite are the most likely to be found by the prospector. The first of the two is the most valuable of the tellurides, containing the highest percentage of gold. It occurs massive, without any indications of crystallization; color, bronze yellow; streak, yellowish gray; brittle; fracture, uneven. There are several varieties of petzite, which resemble each other closely in physical character, but differ a little in chemical composition. The common variety occurs massive to granular; color, steel gray to iron black, tarnishing. In calaverite the ratio of the gold to the silver is 6 to 1 or 7 to 1; in petzite the ratio is 3 to 1; in sylvanite, 1 gold to 1 silver.

THE present terms of "coke" and "charcoal" as applied to tinplate are misnomers. They refer now only to the thickness of the tin coating, a "coke" plate having on it the lightest coating of tin, while "charcoal" plate has a heavier coating. Both are made from identically the same black plate. The use of these terms originated in the fact that when charcoal iron and coke iron were both used in tinplate making, the charcoal iron, being of better quality, had a heavier coating put on it, while the coke iron was used only for the cheap grades, which were given the lightest coating. When steel came to be universally used, the terms remained, referring then only to the quantity of the coating.

THERE is no good foundation for prejudice against "pocket" mines. Nearly all mines are more or less pockety or spotted. A real pocket mine is one where an exceedingly rich bunch of ore occurs occasionally, while the rest of the vein is comparatively barren. Sometimes it takes all the money found in one pocket to carry on the work to reach the next. Occasionally six months or a year's work is spent before a good pocket is found. Some of the pocket mines have been worked for a number of years in a sort of intermittent way, but have been found to pay in the end. The ledges of these mines are usually small. But even in the chimneys of good, well-defined wide ledges there are poor and rich spots—not so marked, of course, as in the true pocket mine, but occurring nevertheless. Possibly the pockety mines will not hold out as long or warrant expensive plants, but then much less ore is mined. Sometimes a vein is pockety and extremely rich on the surface, which, with depth attained, settles down into a steadily paying proposition.

Prof. Black's Permanganate Process.

Written for the MINING AND SCIENTIFIC PRESS by DR. H. NORMAN.

The process under consideration is claimed to be an improvement upon chlorination methods, and was patented by Prof. Black about two years ago, its principal features being reviewed shortly afterwards in the columns of the MINING AND SCIENTIFIC PRESS. Since then no additional information has come to hand, except occasional brief announcements stating that practical demonstrations of the method were being made in New Zealand and the Australian colonies. These demonstrations to popularize his process, however, partook of the character of mere spasmodic endeavors on the part of the discoverer. His duties left him no time to conduct in person more than one or two experiments at the mines visited by him. Succeeding trials had to be entrusted to local operators.

Prof. Black recently made a brief visit to this country, but circumstances compelled his return to New Zealand on a date which precluded work in more than the counties Nevada and Calaveras, Cal. Even this restricted area had finally to be reduced, and the Professor's activity concentrated upon Nevada City and Angels Camp.

The managements of the two companies approached at the latter place granted every facility for the proper exposition of the Professor's discovery, and furnished the bulk of the chemicals used. It is to be regretted that no analyses of the sulphurets under treatment were on hand, and that apparatus to locally determine the percentage of calcium, magnesium and other constituents causing an undue consumption of chemicals, was also lacking. Estimating these points at their exact value, it is not too much to say that the new method justified its claim to preeminence over chlorination. The superintendent of one of the works admitted a saving in the cost of chemicals; the other conceded a slightly higher extraction of gold.

The writer was asked by Prof. Black to undertake a description of the salient phases of his discovery for the MINING AND SCIENTIFIC PRESS, and the present monograph is the outcome of this friendly request.

The chemistry of the permanganate process is simple, as appears from the following equations:

$$3K_2Mn_2O_8 + 24NaCl + 30H_2SO_4 + 8Au = 8AuCl_3 + 6KHSO_4 + 24NaHSO_4 + 3Mn_2O_3 + 15H_2O$$

And:—

$$3K_2Mn_2O_8 + 30NaCl + 24H_2SO_4 + 10Au = 10AuCl_3 + 3K_2SO_4 + 6MnSO_4 + 15Na_2SO_4 + 24H_2O$$

The precipitation of the gold from solution then occurs in the well known manner:

$$2AuCl_3 + 6FeSO_4 = Fe_2Cl_6 + 2Fe_2(SO_4)_3 + 2Au$$

The process is intended as a substitute in all cases where by present methods chlorination is indicated. The most common material suitable for the new treatment would, therefore, be sulphide of iron—the pyrites or sulphurets, which contain variable but usually small amounts of arsenic, copper, zinc and lead sulphides, and more or less gangue. Such mixtures may be either the pulverized raw ore or the concentrates produced directly for leaching, or by-products from preliminary gold extraction methods, generally amalgamation. Telluric ores, it will be seen below, have been treated with much success, but when arsenic enters largely into the composition of the ore variations of the process are necessary. Coppery and leady ores, in which such metals exist to large extent, are not adapted to it, but are better relegated to other treatment, such as smelting. Zinciferous ores are, as a rule, not notably gold-bearing, and their treatment is ever complicated, with loss of gold. Assuming, then, an ordinary case of sulphurets, with no excessive amounts of foreign sulphides, the finely pulverized material is first subjected to a thorough roast—exactly as though preparing it for chlorination. The roasting eliminates the main part of the sulphur in the form of sulphur dioxide, drives off the arsenic as sulphide or as arsenious oxide, and converts the metals into oxides and sulphates. The early stage of the operation is carried on at as low a temperature as possible, otherwise the sulphides may fuse, under which circumstances further oxidation is difficult and incomplete. Towards the end any necessary degree of heat may be employed, as the fusible sulphides have been destroyed and the infusible oxides and sulphates substituted for them during the progressively increasing heat, and under unrestricted access of oxygen. The sulphates are here mostly decomposed into oxides and volatile sulphuric anhydride, the roast being "dead" or complete when the last traces of the latter are expelled. A bright piece of iron immersed in a vessel of water into which a sample of the hot roast has been thrown should remain bright; if tarnished, further heating and rabbling are necessary. This is also an opportune moment to ascertain the condition of the iron. To this end draw a clean, dry magnet through a sample of the roast. Should any particles adhere, arranged in the characteristic bristly manner, ferrous or magnetic oxide (Fe_3O_4) is still present, and the roast faulty. The remedy is an abundant admission of oxygen (atmospheric air) at a dull red heat for a short period, viz.:

$$\underset{\text{(Ferrous oxide)}}{2Fe_3O_4} + O = \underset{\text{(Ferric oxide)}}{3Fe_2O_3}$$

A white heat must be avoided, because under its influence oxygen is driven off, thus:

$$3Fe_2O_3 = 2Fe_3O_4 + O$$

Ferrous oxide would, on the addition of the usual preliminary wash, or of the leaching fluid, which both contain sulphuric acid, be converted into ferrous sulphate, which in its turn would throw down the gold before the elevation of the latter from the pulp. This premature precipitation would mean the loss of most of the precious metal. The first reaction is illustrated by the following:

$$\underset{\text{(Ferrous oxide)}}{Fe_3O_4} + 4H_2SO_4 = \underset{\text{(Ferrous sulphate)}}{FeSO_4} + \underset{\text{(Ferric sulphate)}}{Fe_2(SO_4)_3} + 4HO_2$$

Whereas, if all the iron had been ferric, no such complication would have arisen, as is evidenced by this equation:

$$Fe_2O_3 + 3H_2SO_4 = Fe_2(SO_4)_3 + 3H_2O$$

The admixture of salt to the roast is to be deprecated. In chlorination it is said to be beneficial in instances where the ores are accompanied by a talcose gangue (as at Angels Camp and other places in California), acting by aiding in removing the talcy or grease-like coating of the gold through probable conversion of the magnesia into chloride. In such cases extreme care is required in the management of the heat, for there is an inevitable loss of gold through volatilization of gold chloride, which may more than offset the advantages otherwise. Careful attention to the ordinary oxidizing roast is safer, and the alleged breaking up of talcose gangues by the hydrochloric acid evolved cannot be as great as that possible by the chemically much more active sulphuric acid used in permanganation. Dr. Black permits the use of salt, but it occurs to the writer that any auric chloride formed during the roasting will be dissolved out by the preliminary wash and thus run to waste. The danger of loss from this cause is palpably greater than from mere volatilization of $AuCl_3$ in the furnace.

When the roast is finished it is allowed to cool and is then shaken over screens into a leaching vat of precisely the same construction as those employed in chlorination—that is to say, in so far as the filter bed is concerned. A lid is unnecessary, the vat remaining open during the entire process of leaching. Previous to this, and while perfectly dry, the vat and solution tank must be painted on the inside with hot melted paraffine. It penetrates deep into the fiber of the wood, and one application suffices, maybe, for the whole existence of the vats. Permanganate of potash, in contact with organic matter, rapidly yields its oxygen and is decomposed. It is to avoid this that the paraffine wax is used. While coating the vats, a "float"—a short piece of light pine board, say, 1x12x30 inches—may also be painted on all sides with the hot paraffine. This float is placed upon the pulp in the vat, directly under the jet of the solvent from the solution tank above, and serves to distribute the fluid falling upon it over the entire superficies of the roasted charge. Without such a splashboard, the powerful stream would quickly burrow through the pulp and escape through the outflow at the bottom, instead of percolating slowly and evenly, and dissolving out all the gold.

A preliminary wash of the charge in the leaching vat is nearly always advisable. According to the constituents of the pulp, this wash will consist either of water alone, or of water strongly acidified with H_2SO_4; or of this dilute mixture with a wash of pure water to follow. Lime is converted by the acid into the insoluble sulphate, and in that state does not further interfere with the process. Magnesia, on the other hand, is made soluble and carried off during the washing. Copper, if present, becomes $CuSO_4$, copper sulphate ($CuO + H_2SO_4 = CuSo_4 + H_2O$), which has a marked mechanical affinity for $FeSO_4$. Both may be removed by aqueous lavation and the liquor run onto scrap iron, to recover the copper as cement. To determine whether all the $FeSO_4$ is washed out, it is only necessary to acidulate a sample of the washings with H_2SO_4, and add, drop by drop, some solution of $K_2Mn_2O_8$. The presence of $FeSO_4$ is indicated by decoloration of the permanganate, which will give up oxygen until all the $FeSO_4$ is converted into $Fe_2(SO_4)_3$. When the pink tint begins to stay, the washing may be discontinued. The reaction is shown in the following equation:

$$10FeSO_4 + 8H_2SO_4 + K_2Mn_2O_8 = 5Fe_2(SO_4)_3 + 2MnSO_4 + K_2SO_4 + 8H_2O.$$

In a solution tank at a suitable elevation above the vat a solvent is now prepared composed of approximately 10–12 pounds of common salt, 10–12 pounds of strong sulphuric acid and 10 ounces of commercial permanganate of potash, for every 100 English imperial gallons of water, the imperial gallon being equal to 277¼ cubic inches. The salt and permanganate are dissolved first in, say, 70–80 gallons of water; the acid is now poured slowly into a large pail of water, the diluted mixture added to the salt and potash solution, and the whole made up with water to 100 gallons. On no account must the H_2SO_4 be added without prior dilution, for obvious reasons.

Of course, an aliquot quantity of the solvent may be prepared at one time. However, each ton of pulp requiring on an average 125–150 gallons of solvent, it is convenient that the solution tank should be of a capacity proportionate to that of the leaching vat. If, for example, the latter be intended to hold 40 tons of pulp, the tank should hold $40 \times 150 = 6000$ gallons of solution.

After the preliminary wash the faucet of the solution tank is turned on full, and the liquor run onto the float, until the pulp is covered to a depth of 4 to 6 inches, when the stream is lessened, to correspond to that which will shortly emerge from a partly opened spigot terminating the discharge pipe at the bottom of the leaching vat. The lixivium, or filtrate, carrying the gold in solution, collects in a tank on a somewhat lower plane, and the flow from the spigot is so regulated that the pulp is exhausted before the whole of the solvent has passed through. Generally from ten to twenty hours are needed for this, according to the amount and physical character of the gold. The solution takes place by simple metathetical reaction, and the metal can be detected in almost the very first portions of the filtrate. The latter gains in richness up to a certain point, after which it will gradually commence to go down again. This stage is easily determined by half filling a beaker glass with solution from the spigot, acidifying with H_2SO_4, and adding excess of solution of ferrous sulphate. If, on holding the beaker to the eye against the light, the contents are beginning to show signs of translucency, all the gold has gone into solution. The spigot is immediately turned on full, and an ample water wash completes the leach. The solvent passing through after opening the spigot contains but little gold, and may, therefore, be collected separately, together with the final washings. They are returned to the solution tank, to be used for the next charge. This and a multitude of other economies may be made, suggested mainly by the individual knowledge, experience and ingenuity of the operator.

The concluding phase of the process is the precipitation, which in no wise differs from that practised in chlorination. The filtrate is rendered distinctly acid with H_2SO_4, and a strong solution of ferrous sulphate added to it, which should be freshly prepared, to have it free from the basic per-salts so rapidly formed. Scrap iron is dissolved in sulphuric acid, an excess of iron being always kept present, to counteract oxidation into the ferric compounds, which, of course, possess no precipitating power for gold. The metallic gold thrown down is allowed to settle thoroughly, and the supernatant liquor is drawn off onto a canvas-covered filter of sand, in order to catch any minute particles of gold that may have remained in suspension.

Theoretically, about 6 cents' worth of chemicals will dissolve 1 ounce of gold. In practice the figures are higher, but should never exceed 25 cents, or thereabouts. At the world's greatest gold producer, the famous Mt. Morgan mine, near Rockhampton, in Queensland, Australia, ore having an assay value of 11 ozs. 15 dwt. per ton of 2240 lbs. was treated by Prof. Black at a cost of 4 shillings 6 pence per ton, or about 9 cents per ounce of gold. The extraction was good—95.1%—but not what may be justly expected in time. The professor's experiments there and elsewhere have so far been purely tentative. He desired solely to give publicity to his methods and have them tried by practical men, believing, with the MINING AND SCIENTIFIC PRESS, that "the greatest requisite element of commercial success is wide publicity." A highly satisfactory extraction is also announced from the Bethanga mine, Victoria, a large concern, employing 260 men. The rock, which is crushed by rollers, carries an unusual percentage of arsenic, and does not yield kindly to the ordinary leaching processes. Experiments are proceeding, too, in Western Australia, more especially, in the Kalgoorlie district. Telluride ores from the Great Boulder, the Lake View Consols, and the Ivanhoe mines, assaying as high as 107 ozs. of gold to the ton, have been treated with complete success under the greatest imaginable disadvantages, inasmuch as no elaborately detailed directions—such as are presented here, for instance—were furnished the operators. A batch of ore from the Thames district, New Zealand, sent for treatment to the laboratories of the Dunedin University, was subjected by the teachers and senior students to permanganation. The college records show an extraction of practically 100%, no calculable loss being observable with the sensitive assay apparatus of the University. This cannot but have been an ideal ore, treated under ideal conditions.

Among the principal substances which may be present to bring about an excessive consumption of chemicals and loss of gold are, as already stated, undecomposed sulphides, ferrous sulphate, arsenic, antimony, lead, copper, lime and magnesia. Organic matter must also be guarded against. Wood chips, portions of ore sacks and other products of the vegetable kingdom dropping into the vats will quickly decompose appreciable amounts of $K_2Mn_2O_8$, and so will any dabbling in the solvent with the hands and arms.

The chief points of advantage of the permanganate over the chlorination process are a tremendous sav-

ing in first cost and subsequent maintenance of plant; an extraction rarely as low as, and generally several per cent higher than, in the older method; a reduction of working expenses, and an utter absence of mephitic and corrosive fumes. The cost of gas generators is saved, as is that of ponderous lids for the vats, and of the tackle and carriages on which to move them. The vats, after having been thoroughly impregnated with paraffine, last twenty years or more, instead of two or three years, as hitherto. A mouthful of the menstruum swallowed will show that it is absolutely non-corrodent in the ordinary sense of the word. One large vat at less than half the cost will answer, where so far a number of small ones have been in use. Considerably less floor space is thus required, and a proportionately smaller building, necessitating much less grading, excavating, etc. The cost of chemicals is pronouncedly less, and so is the time occupied by the process. One man can easily attend to all the leaching, no matter how large the plant; and the employment of the pernicious chlorine gas, so destructive to lung tissue and membrane, is wholly done away with. Imperfectibility in details is not denied, but is, on the contrary, freely recognized and closely studied. The cleanness, cheapness and extraordinary simpleness of the method should secure it a reasonably fair trial by all interested. This opinion applies especially in cases where new works are planned. Laboratory experiments will give a good indication of what may be expected on a large scale.

Splicing Wire Rope.

The following directions for splicing wire rope may be found useful, but, as a rule, it is desirable to employ an expert to do this, since it requires considerable skill to splice a wire rope well, and to one unfamiliar with the method of procedure printed directions are of little value. The matter is taken from "Wire Rope, and Its Application to the Transmission of Power," published by the Trenton Iron Co., Trenton, New Jersey:

First.—Clamps are applied to the rope sufficiently far back from the ends to allow plenty of room for the splice, and the men to operate in. The two ends are then drawn together by means of blocks and tackle, until they overlap each other for a space of 20 to 30 feet, according to the size of the rope. At a point from each end midway of the lap, the rope must be bound with a good serving of No. 20 or No. 18 annealed wire. The serving at the extreme ends is then cut off, the strands uncoiled to the new serving and the hemp cores also cut off so as to abut when the open bunches of strands are brought together, and the opposite strands interlaced regularly with each other, presenting the appearance, as near as can be shown, in Fig. 1. The serving x is then cut

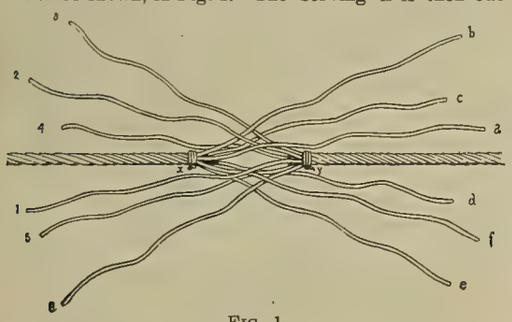


FIG. 1.

off, and the strands 2, 3, 4, 5 and 6 bent back out of the way and tied temporarily to the rope.

Second.—Unlay any strand a, and follow this up with the free strand 1 of the other end, laying it tightly into the open groove left upon unwinding a, making the twist of the strand agree exactly with the lay of the open groove, until all but 12 or 18 inches of 1 is laid in, when a is cut off to within the same distance of the rope (see Fig. 2) and (excepting rope

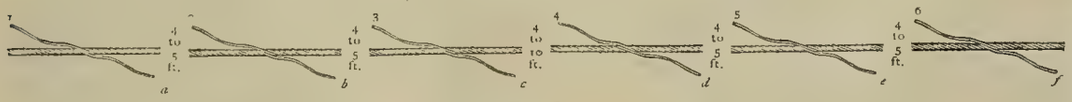


FIG. 2.

of Lang-lay) passed under 1, leaving the ends projecting while the other strands are laid in. Some tie these ends for the time being, although this is not essential.

Third.—Cut off the serving y and unlay a strand 6 of the opposite end, following up with the strand f, and laying it into the open groove as before, treating it precisely as in the first instance. Next, pursue the same course with b and 2, stopping, however, at a distance from the first ends of 4 to 5 feet, so as to leave a space of about a foot between the ends when finally tucked in. Next, do the same with e and 5, then c and 3, and finally d and 4, until all of the strands are laid in, with the respective ends projecting, as shown in Fig. 2.

Fourth.—The next thing is to tuck in the ends, and this is where the skill comes in. Before doing this, care should be observed to see that the spliced portion of the rope is perfectly limp, or free of tension, otherwise this operation cannot be well performed. That portion of the rope where the ends are to be tucked in must first be untwisted, for which purpose special lever clamps are provided made of hard wood, two of which are applied, one on each side of the projecting ends. By turning these clamps in opposite directions the strands are separated, presenting the open appearance shown in Figs. 3 and 4, disclosing

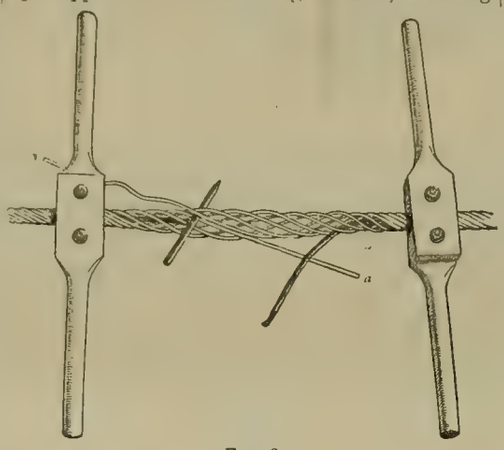


FIG. 3.

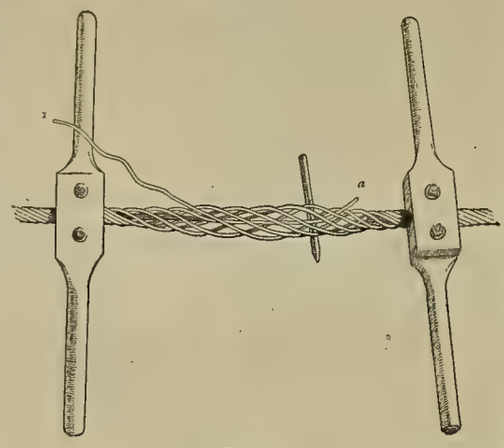


FIG. 4.

the core. Without such clamps, the ropes may be untwisted by wrapping either side in opposite directions with a short piece of hemp rope laid double, using sticks passed through the end loops to turn with. If a vise is available, it will be more convenient to secure one side by this means, in which case but one clamp or rope sling and stick, as the case may be, will be required. The core is then cut and pulled out on the side corresponding with the end to be tucked in, for a distance equal to the length of the end which is to replace it. A sharp knife is needed for this purpose.

The end to be tucked in is then straightened. It is desirable, especially if the rope is composed of small wires, to tie the ends of the strands with soft twine or threads of jute yarn, in order to keep the wires well bunched. A marlin spike is then passed over a and under two of the strands, as shown in Fig. 3, when the core is cut off at the proper point, and, by moving the spike spirally with the strands, the loose end a is passed into the core space and the spike withdrawn. (Fig. 4 shows the end partially laid in, after having cut off the core.) Then pull out the core on the other side, pass the marlin spike over 1 and under two strands, as before, cut off the core, and tuck in the end 1 in precisely the same manner, after which the rope is twisted back again as tightly as possible, and the clamps or other appliances that may be used are removed to the next pair of projecting ends. Any slight inequality in the symmetrical shape of the rope may be taken out by pounding with a wooden mallet. Some prefer to tuck in first all the ends projecting in one direction, and then the ends projecting the other way; it is immaterial in what order they are tucked in. If these directions are implicitly followed, the spliced portion of the rope will be of uniform diameter with other portions and present a smooth and even appearance throughout. After running a day or two, the locality of the splice cannot be readily detected and the rope will be quite as strong in this portion as any other.

Modern Leaching Processes.

Written for the MINING AND SCIENTIFIC PRESS by DR. J. OHLY.

The great number of lixiviating processes, applied at the present in the several plants of the West, is conditioned in part by the extraordinary variety of the ores to be treated, so that a low-grade copper ore, free from certain admixtures, gives quite satisfactory results when leached by means of sulphuric acid only, while other copper-bearing minerals are necessarily excluded from this treatment owing to the presence of basic admixtures, which cause a great consumption of the solvent employed, and thereby entail considerable loss.

This observation refers especially to a class of copper ores, which carry, besides a small percentage of metal, larger amounts of iron, alumina, lime or magnesia, which can not be separated to advantage from the real ore, and are changed, on being acted upon by sulphuric acid, into sulphates, the acid employed for the formation of these salts not being recoverable by any process extant. In such cases a method known as the ammonia process is obviously the one to be chosen, since it is a well-established fact that copper oxide will dissolve at common temperatures in ammonia water, the result being a compound known as copper-ammonium, which has a characteristic blue color, and the more intensely so as the degree of concentration increases. On the other hand, this solvent does not enter into combination with the basic compounds mentioned above, nor does it form soluble salts with them, so that it acts practically as an extracting medium for the copper values, if only such are present in the ore. It is claimed for this process, moreover, by the inventor—Captain Collins—whose address we had occasion to mention in a previous issue, that it makes a cheap cost and close extraction, without roasting, and operates quickly in the recovery of copper, zinc and silver values from ores carrying these metals. Furthermore, we are assured that, in the case of zinc and silver, this solvent will extract the zinc or silver and leave the remaining metals fit for amalgamation or smelting in the same manner, as if no zinc had originally been present. In case minerals containing metallic copper or sulphides in large proportions are to be treated, it is advised that concentration be employed in connection with the treatment under consideration.

The actual veracity of our introductory statement as to the exclusive employment of sulphuric acid for the extraction of roasted copper sulphides is borne out by many cases, where there is supposed to be a secret about the method of treatment, which latter resolves itself usually, on closer investigation, into the simple lixiviation process by means of sulphuric acid or a modification thereof. Thus the extraction works at Clifton, Arizona, limit their leaching operations to the treatment of the tailings from the concentrating tables, and employ for this purpose a low-grade chalcocite, containing from 1.5% to 4% Cu_2S. This ore, when in a pure condition, carries the high percentage of 79.8 copper, the remainder 20.2 representing the contents in sulphur. The improvement or secret in their process, if such it can be called, consists in the production of sulphuric acid from a large body of iron pyrites, occurring in the vicinity—a procedure which has been frequently recommended by the writer in previous communications as a meritorious and money-saving addition to lixiviating works. The Clifton plant produces an acid of 66° Beaume, and it is generally understood that three parts of acid dissolve one part of copper, using dilute acid. The degree of solution employed in these works could not be ascertained by inquiry; but the above given points being at hand, a simple calculation will reveal the proportions of acid and water used. Since the sulphuric acid applied has 60° Beaume, it is identical with the commercial article obtained by the distillation of the chamber acid in sulphuric acid works, which possesses a degree of concentration equalling 65.5° Beaume, and is known to contain 8% of water. From the chemical formula

$$\underset{63.3}{CuO} + \underset{98}{H_2SO_4} + \text{water} = CuSO_4 + H_2O + \text{water}$$

which shortly represents the reaction occurring, and the introduction of the atomic and molecular weights of copper and sulphuric acid, respectively, it will be seen that 98 parts by weight of absolute acid (100%) will effect the solution of 63.3 parts of copper in the presence of water. The acid applied in the Clifton works contains, however, only 92 parts of sulphuric acid in 100, so that the equation

$$98 : 63.3 :: 92 : x$$
$$(x = 59.4 \text{ parts of copper})$$

will give the weight of copper dissolved by 100 parts of the special acid employed, which is 59.4 parts. From the equation

$$59.4 : 100 :: 1 : x$$
$$(x = 1.6 \text{ parts of sulphuric acid})$$

we learn, furthermore, that 1 part by weight of copper requires 1.6 parts of the acid used; and since the statement is made that 3 parts of dilute acid dissolve 1 part of the copper present, the dilution of the acid must take place in the proportion of 1.6 to 1.4, or about equal parts of acid and water.

The same leaching process, as described above, is

in use at the Black Warrior works in Arizona, with the exception, however, that the acid employed in this case is shipped to the plant at a cost of about $15 per ton f. o. b. Denver, while an additional expense of a like sum is incurred by the transportation of the acid to Globe. The ore treated in those works is of a more siliceous character than that of Clifton, and is said to require 3.5 parts of the acid for 1 part of copper extracted. Their process is also surrounded by a halo of secrecy, which, however, dwindles down, on closer inspection, to the "intended" manufacture of the acid in place and the employment (actual) of a concentrating plant of 100 tons capacity with Bartlett tables for the treatment of sulphide ores.

Of the recently introduced processes for the lixiviation of low-grade chalcopyrite (copper pyrites of the formula $CuFeS_2$), which mineral contains, when pure, a copper percentage of 34.6, iron 30.5 and sulphur 34.9, a method reported from France in December of the past year, deserves special consideration, since the writer took occasion to recommend that very operation not long ago in one of his previous articles on the subject under consideration, which was published in the MINING AND SCIENTIFIC PRESS. The first step of this process consists in the roasting of the ore, when the resulting product is mixed with from 12% to 15% of salt and the mixture introduced into a chlorination furnace. As shown by equations I and IV, the iron and copper sulphates formed by roasting are decomposed, the latter, however, only in part, and, in case the operation is conducted properly, not at all, since the sulphuric fumes present instantly change any cupric oxide produced back into the sulphate.

I. $2FeSo_4 = SO_2 + SO_3 + Fe_2O_3$
(sulphur dioxide.) (sulphur trioxide.)

The sulphurous and sulphuric vapors produced react with the salt added, so as to produce hydrochloric acid and free chlorine respectively, thus:

II. $2NaCl + SO_2 + H_2O = Na_2SO_3 + 2HCl$ (hydrochloric acid.)

III. $2NaCl + SO_3 + O = Na_2SO_4 + Cl_2$
(atmospheric oxygen.) (free chlorine).

The liberated hydrochloric acid now reacts on that part of the copper sulphate which may have been decomposed into oxide by the heat of the furnace, while the cuprous chloride eventually resulting from the decomposition of the cupric chloride at a red heat (as shown by equation VI) is changed into its previous condition by the free chlorine present (see equation III).

V. $CuO + 2HCl = CuCl_2 + H_2O$

VI. $CuCl_2$ at red heat $= CuCl + Cl$

VII. $2CuCl + Cl_2 = 2CuCl_2$

The undecomposed copper sulphates enters into reaction with the salt added in the following manner:

VIII. $2NaCl + CuSO_4 = CuCl_2 + Na_2SO_4$

So that the final product consists exclusively of cupric chloride, which is conveyed in form of a sintered crusty mass, after cooling, into vats, and extracted by means of lye water, so as to remove excessive acidity. The liquid resulting is then conducted into other tanks, where the copper is precipitated with old iron. The conduction of the process described above requires care and experience, though an operator of some skill will soon ascertain the essential points of firing, which consist mainly in starting each operation in a cooled furnace, and in maintaining an oxidizing atmosphere in the inner space of the latter by regulating the influx of the air throughout the course of the procedure. With reference to the transformation of chalcopyrite into copper and iron sulphates, by roasting in air, we wish to say that this identical process serves at present for the manufacture of copper sulphate from copper pyrites, when ferrous sulphate is formed simultaneously with the copper salt—a fact which is known for centuries.

In the Butte district, Montana, the cost of precipitation of the copper from sulphate solution is figured at $4\frac{1}{10}$ cents per pound of metal obtained. A plant treating fifty tons of 4% copper ore daily should produce, according to theory, 4000 pounds of the metal, but this amount is practically reduced to about 3500 pounds on account of unavoidable losses and imperfections of the process. For the precipitation of every pound of this copper are required 6 pounds of iron, hence for 3500 pounds of copper 21,000 pounds of iron per day, which cannot be bought for less than $\frac{3}{4}$ cent per pound. The expense incurred in iron alone, used for the precipitation of the copper contained in fifty tons of a 4% ore, would, therefore, amount to $157.50, or $3.15 for each ton of ore treated, or to $4\frac{1}{2}$ cents per pound of the copper recovered, considering that of every 80 pounds of copper present in a ton of the ore only 70 pounds are actually recovered.

In comparison therewith the precipitation of copper from sulphate solutions by means of the electric current cannot be effected, as experience teaches, at an expense of less than 4 cents per pound of the copper produced, so that these two processes equal each other as to the cost involved. It becomes quite evident, then, from these considerations that the electrolytic process for the precipitation of copper is especially adapted for plants situated at long distances from railroad communications, where the acquisition of such great amounts of iron as indicated above will necessarily become a prohibitive factor.

It would appear from theoretical considerations that the amount of iron required for the precipitation of the copper from sulphate solutions should hardly surpass the proportion 1 to 1. This observation becomes clear on representing the reaction occurring by a chemical equation, thus:

$$\underset{63.3}{CuSO_4} + \underset{56}{Fe} = Cu + FeSO_4$$

and introducing the atomic weights for copper and iron into the same, when it will be seen that, according to theory, 56 parts of iron should be sufficient to precipitate 63.3 parts of copper. It must be understood, however, that chemical equations refer to special conditions, according to which absolutely chemically pure bodies only are assumed to react upon one another, while the reactions represented are supposed to occur at 0° C and under an atmospheric pressure of 760 millimeters, known as the normal conditions. On the other hand, the old iron employed for the precipitation of the copper is always contaminated by rust, varnish and paint, and, being frequently of the cast iron variety, contains from 3% to 6% of carbon, which latter is partly combined with the iron and partly admixed in the form of graphite.

To the expense caused by the application of the iron is to be added the outlay incurred by the use of the necessary amount of sulphuric acid, whose bulk in the case under consideration and on employing the commercial article, may be ascertained by the following equation and calculation:

$$CuO + \underset{63.3}{H_2SO_4} = CuSo_4 + H_2O.$$
$$98$$

I. $98 : 63.3 = 92 : x$
($x = 59.4$ copper)

II. $59.4 : 100 = 4000 : x$
($x = 6734$ pounds of sulphuric acid.)

These 6734 pounds of acid, figured at 1 cent per pound, would cause an outlay of $67.34; so that the amount of copper resulting on the end of the operation and consisting of only 3500 pounds, will have cost as to acid and iron used:

Sulphuric acid	$67 34
Iron	157 50
Total	$224 84

While the value of the copper recovered, figuring the latter at 17 cents per pound, will amount to $595, not considering labor or current expenses, and leave therefore a gross profit of $370.16 per day.

The introduction of another leaching method, known as the Hoepner electrolytic process, which is mainly applied to low-grade copper ores, was recently reported from Germany. The solvent used in this case consists of an aqueous solution of cupric chloride, which dissolves the copper in the ore, besides any lead, nickel and silver values present, by undergoing a reduction to the cuprous state during the reaction. The plant, erected at Papenburg, Germany, has a daily capacity of a metric ton, or 1965 pounds, of refined copper, and the ore subjected to treatment is shipped to the works from the celebrated Rio Tinto mine in Spain. It carried 3.37% of copper, besides considerable percentages of iron, and was crushed in ball mills before leaching by means of the cupric chloride solution. After being purified and freed from silver, which may be done by the introduction of copper plates into the solution, the liquid was allowed to flow into a vat provided with carbon anodes and copper cathodes, when the electric current, besides precipitating the copper, caused a regeneration of the cupric condition by the effect of the chlorine liberated at the anodes, so that the solution resulting could be reapplied for the initial purpose. It is claimed that 91% of the copper contained in the ore was recovered after four hours' treatment, and that only 3% of the iron contents present entered into solution. By prolonged contact of the solvent with the ore 98.5% of the copper values were extracted, while only 4% of the iron percentage was dissolved. It is stated, moreover, that 1 H. P. will produce in twenty-four hours 119 pounds of copper in comparison to 33 pounds obtained by the application of the same power in the sulphate process.

Still another process—which, however, does not strictly belong to the category of leaching procedures—has been patented lately in England, and aims at improvements in the treatment of refractory zinc and lead sulphide ores. For this purpose the ore is first crushed and mixed with a suitable proportion of powdered sodium nitrate (Chile saltpetre), or ground together with a solution of the nitrate, when the mixture is strongly heated in a reverbeatory furnace. The effect of the oxidizing agent upon the sulphides present, under the prevailing heat of the furnace, is such as to transform the metallic vapors produced immediately into the sulphates of the two metals concerned, which are gathered in a condensing apparatus. The chemical equations illustrating the reactions occurring are as follows.

$ZnS + 2O_2$ (from the nitrate) $= ZnSO_4$
$PbS + 2O_2$ " " " $= PbSO_4$

Since the resulting sulphate of zinc is readily soluble in water, and the lead sulphate insoluble in that liquid, the separation of the two salts is easily effected by the addition of water, when the lead compound sinks to the bottom of the tank employed, and the zinc sulphate enters into solution. The supernatant liquid, containing the zinc sulphate, is then siphoned off and evaporated to crystallization, and the dilute zinc solutions obtained by washing the precipitated lead compound added to the original fluid. The lead sulphate resulting is either dried and utilized in its temporary condition for the manufacture of chrome-yellow by the addition of bichromate of potash, or reduced to metallic lead by incorporating an appropriate amount of carbon with it, and heating the mixture to complete decomposition.

An English Workman's Views.*

Five years ago I was working in Lancashire at my father's works; and, being in the machine business, I could not but help continually learning of the Americans' ability to build and duplicate machines that were in ways superior to those built in Europe. It occurred to me, therefore, to come over here to the United States to obtain a position in some good machine shop, and to have a practical understanding of how they run things here. I have worked over here some time now in the tool rooms of various machine shops, and have noticed many differences, and one in particular—the eagerness to suggest ways and means over here. I also found quite a little to learn in the standardization and specializing of machines and parts. Almost every nationality is represented in the shops here—from the New England Yankee to the Russian Jews and Italians. Harmony seems to be among them pretty well, and right here in the mixing of nationalities arises a benefit, because out of these men's conglomerated ideas they must hit a good one, once in a while any way. And they have done as has been seen. Although the men are not "sassy" or as "independent as a hog on ice," they have sufficient confidence in themselves to "catch on" and work with a vim.

In my different positions I was in contact most of the time with a class of men who have done more than any other to give an impetus to American manufacturers—that is, I think, the tool-maker of America. If England could bodily "lift" these men from the States—every tool-maker that amounted to anything—and put them to work in her own shops, they would have one of the hardest propositions that any competitor could wish for. Having these men would not, of course, be the whole thing, but it would go a long way. Naturally arises the question, Can an Englishman become as expert and scheme like the American tool-maker? Yes, he can and does so right along. I have worked alongside Englishmen who could scheme and make tools in every way as good as the American born. Maybe he could not scheme to the same extent when he was in England, because no one asked him to; but when he comes here, they not only ask him, but they do something more substantial still—they pay him for it.

I have asked many British-American machinists and tool-makers whether they would care to work in Great Britain again; and though these men were patriotic to the core, they have in almost every case made some such expression as this:

"Not on your life would I care to work back there."

"Why, how is that?" I would say.

"Well, I tell you," they say. "If I were a wealthy man this country couldn't hold me a minute. I would live in England then where art, literature, science and honorable men would be my acquaintances. But I am not a wealthy man; I work by the week, and receive pay according to my ability. Therefore, I would much sooner live here. If my opportunities were as good in England, and my pay equal in purchasing power to what I receive here, then I would much rather live in England."

I know by my own experiences that a state of things exists in England that ought not to exist.

If a workman makes a suggestion in England, 99 cases out of 100 he is ignored entirely. I have been among workmen in England, and in conversation with them have heard them say that they could see where improvements could be made to expedite the production of some particular part of a machine. On asking why they did not mention the matter to the foreman or manager, they say:

"If I mentioned it to the foreman he would snub the idea, or give me no credit for it at all; and if I told the manager, the foreman would think I was after his job, and at the first opportunity discharge me, so I do not see any benefit for me."

Consequently, one of the most vital necessities that any nation, concern or individual should have for success—originality—is not encouraged, but kept down.

That is why America has made such rapid strides in commerce. Once she got started, the American manufacturers have been able, and are able now, to use higher priced labor, to be a longer distance away from foreign, especially European markets, and still underbid their competitors. They may not have

*Correspondence London Engineering.

originated automatic machinery, jigs, gauges, the standardization of parts, etc., but they are able to see at once the great advantage to be got from their usage, and have the foresight and originality to apply labor-saving principles to any fresh department of manufactures they may take up. The term "cute and cunning Yankee" is wrong. He is not cute and cunning, but, to my mind, has an overpowering lust for the dollar and common sense.

When an American machinist or workman has an idea, the patent office is in easy access to his salary. The people are invariably glad to use some new idea, provided there is any little benefit in so doing, and not, as in England, pleased to find so many objections to an invention or scheme. If an idea will only save cents, it has the attention of most every man in its particular department in the States. In England, if the self-same idea would be introduced, people to whom it was shown would say: "Well, it may save a copper or two, but it is not worth while bothering with." And so it is in many departments of English manufactures. Detail is the keynote. If an American can see where a small saving may occur, a small improvement made in their manufactures, a better engraving or a more attractive way of putting their products before probable customers, any little scheme at all that will help, no matter whether it comes from a laborer, manager or president, or whether it is an English, German, French or Russian idea, it receives attention. I had an idea for a certain labor-saving device. I made a sketch, and showed it to the manager of the firm I was with here in the United States of America, explained it to him, and he was interested and saw its feasibility, told me to make a model in his tool room, and see how it came out. I did as he said, it coming out satisfactorily, after which I made application for a patent, which, if granted to me, will benefit me considerably. If the same proposition had been shown to a manager or foreman in England, it would very probably have been poohpoohed.

In England great individuals have been born with very fertile brains—men whose names will never die; but it is not policy to rely on a few men. To encourage and not put down originality, let every man have his ideas considered, and make it worth while for the men to scheme and expedite things, and they will then maybe leave some of their narrow-mindedness and faith in trades unions as to output per man, etc. I know plenty of English and Scotch mechanics in this country that would much rather live in Great Britain if they had a "show" of getting on the same as they have here; they would rather live under a Government of clean politics, which gives law, justice and a proper interest to its citizens, such as England provides. In conclusion, any firm, corporation or nation which can produce per man a greater output than its competitors of articles of equal value will have most certainly the more prosperous people.

Therefore, English manufacturers, take on with new schemes or suggestions, and expedite your manufacturing; maintain and, if possible, better your products and cheapen cost. Let men have your attention so as to get the most out of them, put in good labor-saving tools, use templates, gauges, jigs; have convenient and properly built tools and have a systematic tool room and specialize. If an idea comes from a laborer, machinist or president, if it is an American, German or French proposition, provided it has merit, do not wait, but sail right in and use it. Be always on the lookout for new schemes, and ideas will evolve themselves. Advertise well and "pithy," use good illustrations and bring out the salient points of the machines or articles you produce, be it trivial or momentous. English manufacturers have the advantage of a fine geographical position, have a good and well-established business reputation and can not be approached yet in some of their industries. Therefore, do not get scared because you do not get orders for every quotation you submit. English manufacturers with the right kind of thought will always have a good living for themselves and the people dependent upon them. H. HARRAP.

GEO. F. WRIGHT, who returned on the steamer Pennsylvania from geological explorations in Siberia, says that at a place where he believes the children of Israel crossed the Red sea he found nothing to indicate that the soil was of glacial origin. His researches showed instead that the northern part of Asia had been within the age of man covered with from 750 to 3000 feet of water. On some mountains he found gravel at a height of 700 feet.

THE Geological Survey has begun work on the California-Nevada border involving ultimate expenditure of about $10,000,000, distributed over a period of about ten years. The work will be mainly along the Truckee, Carson and Walker rivers. The corps will measure the volume of streams, capacity of possible reservoirs, and estimate the cost of building them.

A SACRAMENTO, CAL., telegram announces the appointment of L. E. Aubury of Los Angeles as State Mineralogist of California.

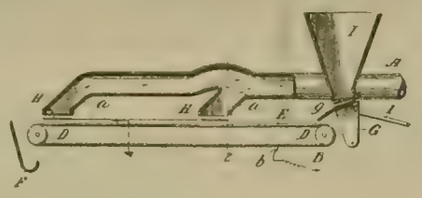
BEGINNING on the 1st inst., domestic rates of postage apply to all mail matter passing between the United States and Cuba.

Mining and Metallurgical Patents.

Patents Issued March 26, 1901.

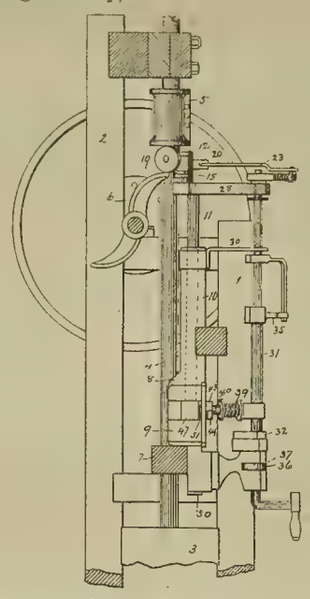
Specially Prepared for the MINING AND SCIENTIFIC PRESS

ELECTRIC ORE CONCENTRATOR.—No. 670,440; H. M. Sutton and W. L. Steele, Dallas, Texas.



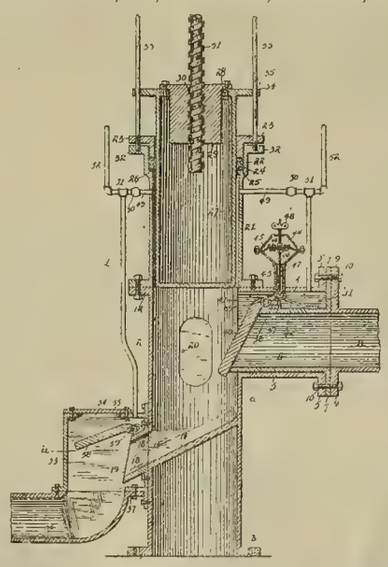
Combination with moving ore-conveying surface, of means for electrically charging same, exhaust device provided with hoods disposed above surface, electrically repulsive screens disposed between surface and hoods, feed hopper adapted to discharge upon moving surface, rocking shaker disposed between hopper and moving surface, receptacle to receive material discharged from surface.

STAMP MILL ATTACHMENT.—No. 670,549; L. R. Tulloch, Angels Camp, Cal.



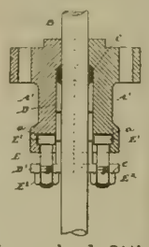
Combination, with tappet and cam, of prop for tappet, bearing thereon, arm revoluble on bearing, roller carried by end of arm, movable block, lower vertical shaft section, upper vertical shaft section movable therein, means for causing shaft sections to rock in unison, arm on upper shaft section, link therefrom to first arm of such length that continuous movement of upper section produces reciprocating movement of roller to insert same between cam and tappet and withdraw same, arm on lower shaft section moving block beneath prop.

PUMP.—No. 670,868; P. J. Bode, St. Louis, Mo.



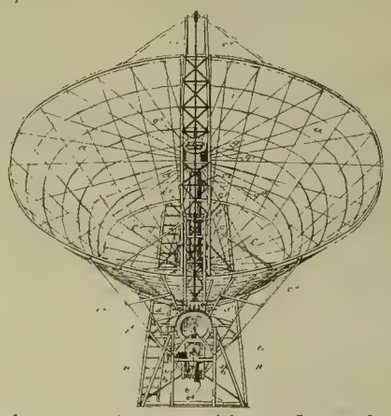
Pump to handle dredging material, working barrel mounted upon receiving chamber, plunger operating in working barrel, means for propelling plunger, suction valve placed in chamber formed on upper side of receiving chamber, discharge valve placed in discharge chamber formed on lower side of receiving chamber, arranged opposite one another, chambers connected by inclined bottom, diaphragm mechanism communicated with suction valve for aiding operation, diaphragm mechanism operated by atmospheric pressure.

ROCK DRILL.—No. 670,750; W. Wood, Paterson, N. J.



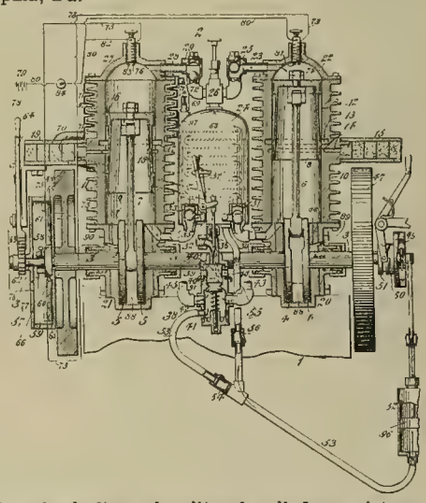
A cylinder head, a gland fitting therein having flange, holding bolts securing gland to head, inwardly opening recesses in latter receiving heads of bolts, body portions thereof lying in slots opening into recesses extending axially through flange and receiving nuts on outer ends, whereby heads of bolts are locked in recesses by gland.

SOLAR GENERATOR.—No. 670,917; A. G. Eneas, Boston, Mass.



A solar generator comprising reflector having curved reflecting surface focusing at all points along straight line or focal axis, pivotal fixed supports for reflector at opposite sides thereof for diurnal movement of reflector, means for varying angle of focal axis relatively to fixed pivotal diurnal axis of reflector according to declination of sun.

GAS ENGINE.—No. 670,803; T. McMahon, Philadelphia, Pa.



A main shaft, a plurality of cylinders, pistons for cylinders, reservoir, pipes leading from lower portion of reservoir to lower portion of cylinders, and pipes leading from upper portion of reservoir to upper portion of cylinders, means for supplying gas to cylinders, means for controlling supply, valves in pipes arranged to permit gas to be forced from lower portion of one cylinder into upper portion of other cylinder through reservoir.

THE Cochiti G. M. Co., Bland, N. M., are operating by electric power transmitted 32 miles from a steam power plant at a coal mine. The cost of the transmitted power, a half more being used, is less than one-fourth of the steam power displaced at the mine, where wood had to be used for fuel.

THE U. S. Geological Survey is making a preliminary geological and mineral survey of Cuba at the expense of the Island Government. Dr. C. W. Hayes, T. W. Vaughn and C. Spencer are now beginning the work.

MINING SUMMARY.

Specially compiled and reported for the MINING AND SCIENTIFIC PRESS.

ALASKA.

That an ore sampling and reduction works will be established in White Horse next summer is asserted by E. C. Hawkins.

Dawson reports that during a recent stampede to Gold Run and Eureka eighty men staked one claim and made a rush to record it, and at the mouth of Gold Run 100 men made a similar scramble for three claims.

The February report of the Alaska-Treadwell M. Co. shows 25,540 tons ore crushed by 240 stamps in twenty-seven and one-half days, value $38,370, and 510 tons sulphurets, saved, value $22,720; gross yield for the month, $65,090; ore yielding $2.60 per ton; estimated expenses for the month, $36,026.

The Crackajack mine, A. H. White manager, at Hollis, Prince of Wales Island, is producing high-grade gold-bearing quartz. The mine is opened by three tunnels, the lowest in 150 feet on the ledge. While carrying some free visible gold, the values are principally in iron and arsenical pyrite.

ARIZONA.

COCHISE COUNTY.

The Copper Queen is now employing 1600 men, and their monthly output of bullion is not less, on an average, than 2000 tons per month, frequently running much more than this. The daily output sometimes runs as high as ninety tons. Much of their ores now run high in silver and gold.

Bisbee, March 26.

The Copper Queen mine, Bisbee, is located in a gulch or ravine which drains toward the east. On the north side of this gulch is a porphyry formation, wherein there has been a considerable amount of prospecting in shafts as deep as 800 feet, without as yet finding much ore of value. On the south side of the gulch is a great lime capping which overlays a vast copper ledge in a nearly horizontal position, but dipping slightly to the southeast. The Copper Queen, Calumet and other groups are embraced in this mineral belt. The ore bodies comprise vast deposits of copper carbonates, including much of the malachites and azurites and black oxides; and as the workings proceed southeastward they disclose immense bodies of copper sulphides, including pyrites and chalcocites. There is no regularity about the relative position of the two kinds of ore deposits specified. In the Copper Queen a carbonate ledge overlays a sulphide stratum in one place and the order is reversed in others, the two kinds usually being separated by a horse or roll of lime. But, in general, the sulphides appear to preponderate as the dip of the ledges are followed to the southeast. This theory is supported by recent developments in the Calumet and Arizona group.

The Copper Queen is worked through three shafts — the Czar, Holbrook and Spray. They range in depth from 750 to 850 feet and are all connected on the 200, 300, 400 and 500-foot levels. The underground work includes approximately 80 miles of drifts and crosscuts wherein car tracks are laid. The method pursued here is to stope on a face of ore from 30 to 50 feet high, timber up with square sets and fill in partly with waste. On some of the stopes, on the 200 level, is a temperature of probably 120 to 130 degrees, which is produced by the rapid process of oxidization that goes on as the ground is being broken. In these overheated chambers the air is good and of ample volume, but all effort to cool that section has been without success. The ground worked through is heavy, inclined to swelling, making timbering of the most thorough character necessary. The new Spray shaft is equipped with modern hoisting engines and an up-to-date steel gallows-frame. At present no air drills are in use in the Copper Queen, the structure of the ledge matter being rather loose and easily broken. S. W. Clawson is mine superintendent.

There are five furnaces in operation at the Copper Queen smelter—four of the old round type and one of the Mitchell square type. The five are smelting about 800 tons of ore per twenty-four hours. There are four copper converters in operation and a fifth will soon be ready for use. The bullion produced contains some gold and silver with the copper. All ores above the 400 level were oxidized, carrying copper carbonates, but in some of the newer workings at 500 to 700 feet depth they get into a copper and iron sulphide, with about 24% of silica. The carbonates carry as high as 22% aluminum, which goes out in the slag. The sulphides and oxidized ores are mixed in the charge about half and half. The slag is hauled away by a small locomotive and the molten material is handled from furnace discharge to converters by an electric crane.

The two flues, each 600 feet long, 8 and 10 feet in diameter, pass from the furnaces up the mountain side at about 45° elevation and are constructed of iron. The dust herein gathered runs about 8% copper. It is mixed with pulverized ore oxides, briquetted and returned to the smelter.

In making up the charge for the furnaces the sulphides are roasted, and largely desulphurized by Douglas roasters, before they are mixed with the carbonates. The product of the Copper Queen smelter is now running at the rate of about 3,500,000 pounds of bullion per month. James Wood is superintendent of the smelter.

The same parties who control the Copper Queen are building a railroad from Bisbee 100 miles southward into Sonora, Mexico, to their copper mine and smelter at Nacoserio, which have been operating about eight months. Tracklaying on the new road is in progress, 10 miles having been completed. WASCOTT.

Bisbee, March 28.

The Lowell & Arizona Copper M. & S. Co. are developing a property south of the Copper Queen and Calumet, which is the direction in which the known ore body of the camp is supposed to dip. They have put up first-class hoisting equipment and have sunk a shaft 880 feet in the lime formation. Levels have been run on the 500, 600 and 800 levels, in all aggregating over 2000 feet of work. On the 800 level six different drifts have been run in as many different directions as prospecting work. The rock generally is an altered lime, but the work discloses streaks of oxidized manganese, decomposed quartz and one drift cuts through an immense deposit of siliceous conglomerate and wash material. As yet no ore of consequence has been found, but sinking will be continued to considerable depth. F. C. Fenner is superintendent, A. C. Dawe mine foreman.

Bisbee, March 29.

On the 1st at Tucson, M. Costello received $500,000 in cash from the Lake Superior Co. for his copper mines at Bisbee.

GRAHAM COUNTY.

The Arizona Copper Co., James Colquhoun manager, smelts direct its first-grade ores, concentrates before smelting its second-grades and leaches the concentrator tailings which result from carbonate ores, the latter ores being concentrated separately from the sulphides. Of the 20,000 tons per month concentrated, the principal proportion is low-grade sulphides. The leaching process now in vogue here is the result of experiments and practice at this plant for a number of years and includes many features peculiar to this property alone. The record of production here shows that, while the grade of ores has diminished year by year, the method of extraction has constantly become more thorough. Seven to ten years ago ores running less than 20% were not smelted. To-day the plant operates profitably on ores that average no higher than 3¾%. The product of the smelter here amounts to approximately 10,000 tons of copper bullion per annum, or at the rate of 1,666,000 pounds per month.

The concentrating mill is built in three sections, the result of additions and enlargements. The newest section is in a steel structure, with a vanner room 75x150 feet, containing thirty-six Frues, operated by a Union duplex gas engine. Another section contains twenty-one vanners; in another are fifteen Wilfley tables. In brief, the process comprises crushers, rolls, trommels, Huntington mills, vanners, recrushing of tailings to 1 millimeter fineness, the latter passing finally to the slime tables.

In the power house are five high-speed 65 H. P. gas engines, which operate five dynamos that run the blowers, twenty-one concentrators and other machinery. Four other gas engines operate the air compressors, and two others run generators which supply electric light. The compressed air is for the operation of the copper converters at the smelter.

Clifton, March 24. WASCOTT.

MARICOPA COUNTY.

The Gold Coin M. Co. has incorporated at Phœnix, C. S. Hoover manager, to work a property 8 miles west of Kyrene, 14 miles south of Phœnix.

MOHAVE COUNTY.

The New Comstock M. Co. has been organized in Los Angeles by S. C. Bagg to operate near Kingman.

PIMA COUNTY.

In Boston is being floated 100,000 shares Catalina Copper M. Co. at $2 per share. A circular signed by the company states it has $600,000 capital stock and property near Tucson—claims 1 mile in length, ¼ mile in width—and that the proceeds of the stock are to be used for development work.

PINAL COUNTY.

L. D. York of Los Angeles, Cal., has bought a half interest in the Grand Central group, 20 miles east of Florence, for $3000.

J. Rhifer and R. Monterey think they have found the extension of the old Silver King mine, near Florence.

CALIFORNIA.

AMADOR COUNTY.

Near Drytown the Centennial mine, Supt. Gross, is developing, drifting north and south from the 600-foot level. In the latter is a large body of low-grade ore.

On the Mokelumne river, 2 miles from Wallace, on the Holman ranch, a gravel proposition is run by electric power. The water is carried by a flume to the pay gravel, a steam shovel dumps the gravel —mixed with black sand—on a leather belt that sends up one cubic yard per minute. The flume carries 2600 inches of water.

The Amador Queen No. 2, J. R. Phillips Supt., has resumed operations.

The Rhetta Con. G. M. Co. has incorporated, to mine near Plymouth.

The Kennedy mine, at Sutter Creek, now has three working shafts, all connected at or below the 2000-foot level, the north and east shafts having been just connected.

BUTTE COUNTY.

On the Big Butte placer, 25 miles from Chico, a third tunnel is being run to drain the property.

The Old Blackleg mine, near Chico, has been reopened.

The Pershbacker, down 500 feet, is reported closed.

CALAVERAS COUNTY.

The Mead G. M. Co. will sink on one of its ledges near Rich Gulch.

The Sheep Ranch mine is running on high-grade ore, employing fifty men.

EL DORADO COUNTY.

Near Placerville the mill at the Church mine is operating five stamps.

KERN COUNTY.

The Standard Oil Co. is now reported to have storage capacity for 175,000 barrels oil in Kern River district. Twelve additional tanks would make the total capacity 400,000 barrels.

Ex-Congressman C. A. Barlow has bought of the Pittsburg for $20,000 a forty-acre tract in the northwest quarter of 1, 11-24, not improved territory but locally considered a good buy.

Oil men expect the railroad companies will voluntarily reduce the charges on oil shipments to 30 cents a barrel to San Francisco.

The last cleanup of the Yellow Aster at Randsburg was the best for months. A pipe line is being surveyed to run the tailings from the 20-stamp mill to a tailing pond. Fifty stamps of new mill will be ready to start next week.

Long distance telephone connection has been made with Randsburg, Garlock and Johannesburg.

The tankage of the Kern River district is 700,000 gallons. The McKittrick district is daily producing 2000 barrels.

LOS ANGELES COUNTY.

The Columbia Oil Co. has leased from the Union Oil Co. 100 acres of land lying west of the Santa Fe territory in the Fullerton field.

A controlling interest in the Cahuenga Oil Co. has been sold to Wm. Ferguson for $14,000. The company's holdings consist of ten acres of land on which three wells have been drilled.

MADERA COUNTY.

The Rex mine at Grub Gulch has its stamp mill crushing good ore; the mill is run by gasoline engine.

The Savanna mine, at French, on the Fresno river, expects to operate its 10-stamp mill.

Grub Gulch, March 26.

The Spangle mine ore will be crushed by a new mill now about completed.

MARIPOSA COUNTY.

At Princeton the Grant people are putting in foundation for an additional mill.

MONO COUNTY.

The Arnot mine at Bridgeport, A. P. Sayre Supt., is to be worked on a more extended scale by Eastern capital.

NEVADA COUNTY.

The German mine has been examined and will be sold to Eastern men if the report is satisfactory.

The Boss mine, near Sweetland, is to be unwatered.

The Providence M. Co. has levied assessment No. 1.

The Yuba mine, at Maybert, is to be connected by telephone with Nevada City.

It is thought that the new important strike in the Champion mine at Nevada City, the ledge now 20 feet wide, will start all seventy stamps of the mill in operation.

An electric railway is again talked of between Grass Valley and Nevada City.

Supt. Jeffrey has a crushing from the Gold Blossom mine which yielded $38 to the load.

The Centennial mine, on Osborn hill, is bonded by J. E. Carter.

Six practical miners have leased the Seven-Thirty mine at Deadman's Flat.

J. E. Carter has bonded the Centennial mine, Grass Valley, and is arranging to start work.

W. Campbell of Grass Valley has foreclosed a mortgage on the Slate Ledge mine at Forest Springs for $13,600.

The shaft at the Bullion Con., G. Mainhart manager, Nevada City, is 1000 feet deep and will be continued deeper. The San Francisco people who were operating it under bond have completed the purchase.

P. C. Drescher is arranging for the reopening of the Bellefontaine quartz mine at Nevada City. The shaft is down 350 feet and a larger pump is to be installed to sink deeper.

PLUMAS COUNTY.

O'Brien & Hammon have bought the Spanish Ranch mine.

The Spanish Ranch mine is reported sold to W. P. Hammon of Oroville and J. K. O'Brien of Marysville. Prospecting the mine by drill has been done for several months past.

SACRAMENTO COUNTY.

The Ashburton mine will resume operations near Folsom with its dredger machinery July 1.

SAN DIEGO COUNTY.

The boundaries of the new Colorado desert mining district were fixed last week at a miners' meeting at Carriso creek section; L. A. Wright president, H. E. Mills secretary.

SANTA BARBARA COUNTY.

The North Star Oil Co. has its wharf at Summerland out from shore 250 feet and will begin drilling on the ocean beach.

SIERRA COUNTY.

The Thistle Shaft Co., at La Porte, have started their tunnel toward the drift ground opened by the shaft.

SISKIYOU COUNTY.

At Callahans the Siskiyou Hydraulic M. Co., E. Boyer manager, has 100 men employed on two hydraulic plants at South Fork and Wild Cat.

Philadelphia men compose the Consolidated M. & D. Co., who propose building a dredger.

The Golden Star mine has been bonded to C. E. Brown for nine months for $15,000.

The Oak Bar M. Co. has started up hydraulic operations under the superintendence of W. Bannister.

The Greenhorn No. 2 drift mine, at Yreka, is said to be bonded to W. T. Shurtleff, who will reopen it. At the Greenhorn No. 1 the tailings are being reworked and a new shaft is to be put down.

TRINITY COUNTY.

The Sweepstake M. Co., G. Hall, manager, Weaverville, is preparing to hyhraulic their gravel mine. It is an old channel carrying coarse heavy gold. Mr. Hall says they will construct a 27-mile ditch from Canyon creek this summer.

TUOLUMNE COUNTY.

The tunnel in the Grand View gravel mine, below Montezuma, is completed.

At Jacksonville the Clio mine has resumed operations.

In the north drift of the seventh level of the Jumper mine a new ore shoot has been found.

Supt. Holland will put in new boilers and hoisting engine on the Providence.

The Confidence G. M. & M. Co. has incorporated at Sonora to buy the Confidence quartz mine and mill site, the Independence quartz mine and the Jessie and Edith quartz mines.

The Longfellow mine is temporarily closed.

L. Dondero has taken out $12,000 in a few days from his old channel claim at Yankee Hill, near Columbia, close to where old owners of the claim had stopped work. One nugget weighed three and one-half pounds, value $650.

The Golden West M. Co., R. Restano Supt., has bought a water right and proposes to operate the mine by electricity. A 10-stamp mill will be built this summer.

The superintendent's annual report of the Jumper states that 103,000 tons of ore are in sight, as against 100,000 the previous year. The shaft is down 1353 feet. The costs of mining, milling and development aggregate $4.55 per ton, as compared with $6.10 the previous year.

YUBA COUNTY.

Placer mining is to be resumed at Smartsville.——The Blue Point mine has been leased to San Francisco men.

COLORADO.

BOULDER COUNTY.

The B. & M. Co., at Ward, are preparing to sink from the 850 to the 1000-foot level.

Col. Brainard is running a tunnel from Camp Talcott to cut at depth the principal veins of Ward district.

The Ward Mountain tunnel, at Four Mile, Ward, has cut several rich veins that are now being mined through it.

CLEAR CREEK COUNTY.

Gileon & Co. are shipping from their lease on the Independence at Georgetown. The stope they are working is 100 feet long, of high-grade ore, from 1 to 2 feet in width, containing bunches with considerable hessite mixed through the ore, the hessite carrying values up to $20,000 per ton.

The Silver Age mine shaft has been unwatered and sinking will be resumed. The mill has been remodeled and four concentrators have been added.

It is reported that the Shively mine at Silver Plume is to be reopened by an Eastern company. —— The Pelican and Bismarck properties have been large shippers during March.——The Vulcan and Kalamazoo are to be reopened by Denver and Ouray people. J. Butterfield is Supt.

GUNNISON COUNTY.

The Chloride mine, Gunnison, is producing from 80 to 100 tons per month, averaging $50, principally gold. The main shaft is to be sunk to the 300-foot level. ——The Cortland mine is taking out $150 ore from a crosscut in the bottom of a new shaft.——Sharpe & Severson are operating the Calumet and shipping $100 ore. ——The Colorado S., M. & M. Co., Pitkin, is pushing development. The Silver Basin deep shaft in Chicago park is down over 300 feet and expected to soon reach the first ore-bearing contact. It is sinking for ore bodies discovered by the diamond drill in 1893.

The Colorado-California S. M. & M. Co., operating the Ruby Chief mine at Irwin, are sinking a shaft.

HINSDALE COUNTY.

A strike is reported in the Golden Fleece, the tunnel at 2690 feet cutting 6 feet of galena, believed to be the old Enterprise vein. The strike is 800 feet below the surface.

LAKE COUNTY.

Supt. W. Hollister of the President mine, Leadville, is sacking ores containing a percentage of bismuth. Herf & Ferects of St. Louis, in addition to London buyers, are reported now buying bismuth in Leadville.

At Leadville, Supt. J. Nimon of the Home mines has 125 men at work. The daily yield is 325 tons of iron and some lead carbonate ores. The most of this material is sold upon controls carrying twelve ounces silver associated with 50% iron excess, netting about $6 per ton.

The Leadville Pumping Association is suing the Midas and the Augusta M. Cos. and J. F. Campion for $5221.82 alleged due as their proportionate amount for unwatering the down town mines in 1896.

On the 1200-foot point in the main incline of the Little Ellen at Leadville a pay streak said to be 1 foot thick was uncovered assaying fourteen ounces in gold.

Manager Newell says the north upraise from the main level in the California Gulch shaft at Leadville has reached the top of the lime, finding a streak of iron that carries thirty ounces silver per ton.

The Bonanza G. M. & M. Co., Leadville, has been organized to work Doctor group; W. E. Newton Supt. Machinery will be put on and the property developed.

PARK COUNTY.

The Bonanza G. M. & M. Co., on the Doctor group, Pennsylvania mountain, will do considerable work this season, W. E. Newton, superintendent.

Several companies will work the placers along the Platte river by dredging this summer.

SAGUACHE COUNTY.

The Crestone Mineral Co. has purchased the Hopkins property at Crestone and will start development at once. Much of the ore is free milling and as soon as sufficiently developed a mill will be bought.

SAN MIGUEL COUNTY.

The Keystone Hydraulic M. Co., E. L. Davis manager, says the construction of the company's hydraulic plant will begin soon.

At Telluride, the Tom Boy Co. will erect an aerial tramway 800 feet long from the Argentine to the Columbia-Menona mill and will put the mill in shape for crushing. It is locally reported that the Tom Boy Co. has purchased all the Columbia-Menona holdings.

The Crown Point group at Ophir has been bought for $40,000 by a Milwaukee company. G. R. Dolph is manager. Development work is being pushed.

The Alta, in Turkey Creek basin, is shipping a car of ore per week that carries 100 ounces in silver and 30% lead, beside values in gold. The gross value per car is $900, net $700.

The La Sal Copper Co. at Cashin is completing a mill to operate the calcium-hyposulphite leaching process for treating low-grade silver-copper ores that cannot be shipped profitably.

Morrison & Elliott, leasing the Sheridan dump, say an addition of five stamps will be made to their mill, making it fifteen stamps.

SUMMIT COUNTY.

Manager Wood says the Cashier mill at Breckenridge is treating fifty tons of quartz daily, and that the cyanide plant is completed and will start immediately. ——The Iron Mask has a few men working in the lower tunnel, cleaning out and retimbering.——P. L. Cummings and H. Litton have started on the Liberty tunnel, driving for the Liberty vein.

TELLER COUNTY.

At Victor, W. S. Stratton has suspended operations on the east shaft of the Lucky Guss.

Cripple Creek reports a production of 100 tons a month from the Santa Rita, on Squaw mountain. The grade of ore is from 1.20 to 15 ounces.

The Independence is increasing its production and doing a large amount of exploration work; month's production is estimated at $250,000—an increase of 25% over the output of recent months.

Wilson & Dalzell, leasing the Vindicator at Cripple Creek, have completed enlargement and timbering the Pinkerton shaft. They have a depth of 250 feet and will continue to 700 feet before drifting. The lease requires sinking to 700 feet, but allows two years' operation afterward.

A strike has been made in the Vindicator, Victor, east of the shaft at a depth of 900 feet.

The 115-foot level of the New Haven, Victor, is opened 120 feet south and 60 feet north. The east vein has been followed 40 feet on this level and shipping ore obtained. The 200-foot level is opened north 65 feet and a further advance of 25 feet is expected to reach the Parkins ore shoot.

On the Wire Gold, Victor, at a depth of 50 feet a crosscut has been run 20 feet west on a granite and phonolite contact, and thence into the latter, following a 3-foot vein from which a trial shipment will be made.

The Stratton-Cripple Creek M. & D. Co. has incorporated, capitalized with 20,000,000 shares, par value 50 cents.

The German-American Co. are shipping from the Ophelia tunnel, Cripple Creek, at a depth of 240 feet. The pay streak is more than 1 foot wide and has been opened about 180 feet.

It is reported that work will soon be started in the shaft of the Plymouth Rock, Cripple Creek. The shaft is down 1065 feet; its prospective depth is 2800 feet.

In the Elkton at Cripple Creek the mine is being unwatered and it is believed will be clear for the resumption of work in the lower levels by May.

The dumps at the Independence are being worked by leasers. F. Herman has dump No. 1, containing the waste taken out during the opening of the mine by Stratton. He handles 300 tons a day, making a gross output of $2500 a month, which pays a fair profit. In handling the dump the rock is first hand-sorted, passed over a 1-inch mesh screen and then a second screen of ⅝-inch mesh. It is then sorted a second time and passed to a "washer." The slimes are collected in two settling tanks, the water being reused to avoid loss. A third sorting is then made. About 4% of the dump handled is ore. Murray & Co. have the second dump, which receives the present waste of the mine. About the same amount of rock is handled daily, but it is reported that higher ore values are sorted out.——The Gilpin & Cripple Creek G. M. Co. has installed a battery of air drills on the Atlanta claim. Operations are confined to sinking the shaft, now down 440 feet. When the 500-foot point is reached a crosscut will be run east and west for the purpose of thoroughly exploring the property.——Schoolcraft & Co., leasing on the Atlanta, crosscutting at the 100-foot level, have opened up a dyke which assays well.——Three miners leasing a fraction of the Atlanta are drifting on a 3-foot vein, assaying $20 to the ton.——The Accident, at Cripple Creek, S. McDougal owner, is to start up.

IDAHO.

ADA COUNTY.

Near Boise, Chas. Balbach, manager Homestake mine, will operate the 10-stamp mill this season.——G. W. Bredehoft, manager the Daisy, has a 200-foot shaft, and will shortly start the 10-stamp mill.

BOISE COUNTY.

At Idaho City the War Eagle Co. have resumed operations in their East Hill placers.

F. Carpenter, of Idaho City, is to operate a placer claim at Grimes' Pass, which the Ingle Q. M. Co. recently bought.

IDAHO COUNTY.

The collection of mineral exhibit for the International Mining Congress, to be held in Boise in July, will be in the hands of State Mine Inspector Jacobs.

NEZ PERCES COUNTY.

Twenty tons of ore from the Dewey, at Lewiston, expected to net $10,000, are stated to have been shipped to the smelter.

OWYHEE COUNTY.

Near Silver City Getchell & McKinnon report bonanza ore in their Bullion claim, south of the Potosi mine.

SHOSHONE COUNTY.

At Wallace, in the Amador the crosscut from the bottom of the shaft has cut the ledge and 4 feet of ore found without getting across the shoot.

The Mammoth M. Co., at Wallace, will discontinue Sunday work, closing down with the day shift on Saturday. The plan of working only six days in the week will have much the same effect as reducing hours.

WASHINGTON COUNTY.

The Boston & Seven Devils Copper Co. is locally credited with intention to erect a 100-ton smelter plant at Landor.

MONTANA.

The Kennett M. Co. is locally credited with intention to put a new hoisting engine and other machinery on the mine and start a new perpendicular, double-compartment shaft to be sunk 1000 feet.

BROADWATER COUNTY.

Near Townsend, H. C. Wilson is spending considerable money running bedrock flumes and will hydraulic this season.

The Stockton Copper M. Co., operating near Radersburg, has bought the North Star group; J. Rothfus, general manager.

DALY COUNTY.

An injunction issued in the Heinze litigation has compelled the Boston & Montana to suspend work on the Leonard mine. About 300 men were laid off. Heinze claims that the veins upon which the Boston & Montana has been mining in the Leonard, Gambetta and Piccolo belong to the Minnie Haley, in which he owns an interest.

FERGUS COUNTY.

Finch & Campbell, of Spokane, have bonded for $450,000 the Kendall mine, an open quarry 125 feet wide, 40 feet high. The ore averages $10 in gold per ton.

FLATHEAD COUNTY.

In the West Fisher mining district, the new town of Foundation is a flourishing little camp. So fast is it growing that it has a newspaper but up to the present time no postoffice.

Manager O'Brien of the Fisher Creek Co. will start the mill this week and more stamps will be added.

The American Kootenai M. Co. has fifteen miners doing development work. Manager W. J. Beager states the mill will be running on ore about April 15. In the face of tunnel No. 1 a new strike of rich ore is reported.

Cleveland, O., men have bought the Mother Lode group and will put in modern machinery.

Libby, March 27.

A rich strike is reported from the West Fisher district, near Foundation. The ore runs high in gold and is free-milling.

GRANITE COUNTY.

At Garnet, Supt. Mussigbrod will increase the capacity of his mill from ten to twenty stamps.

JEFFERSON COUNTY.

The Oconta and Consberg groups have been bonded. The mines are opened by a 600-foot tunnel, which will be continued; T. H. Mitchell is the Supt.

LEWIS AND CLARKE COUNTY.

A strike is reported in the Howard mine, 2 miles above Helena; ore is said to run over $150 a ton; C. A. Sheldon, manager.

M. W. Alderson has bonded the Daylight mine, near Unionville.

MADISON COUNTY.

F. J. Dahler of the Ajax mine, Silver Star, has a carload of ore that goes $300 gold to the ton.

The Porphyry gold mine, at Pony, has been bonded for $15,000, and the purchasers have put a shaft down 100 feet.

MEAGHER COUNTY.

The bond for $150,000 on the North Pacific and Darling Fraction mines at Copperopolis was paid March 1st. These mines have been shipping copper ore 18 miles to the railroad.

PARK COUNTY.

At Cowles P. O., E. H. Cowles, Supt. Ethan Allen mine, will put an additional twenty stamps in the mill before the end of the year, to be running the mill and mine machinery by electricity, from a plant to be erected on Basin creek, 3½ miles from the mine. McNulty Brothers, who operate the Natural Bridge Gold & Copper Co. mine and mill, 20 miles above the property, are going to add ten stamps to the mill.

SILVER BOW COUNTY.

In Butte it is said that a syndicate with O. H. P. Belmont at the head is being formed, with a capital of $10,000,000, to acquire the copper mines now in litigation between T. A. Heinze and some of the properties of the Amalgamated Copper Co. The Nipper and the L. E. R. are two of the biggest mines involved. It is said that T. A. Heinze will receive $4,000,000 for his interests in the syndicated mines and that the Amalgamated Copper Co. will take stock to the extent of their present interests in the mines. It is believed that the deal will close the litigation over a number of Butte mines.

NEVADA.

ELKO COUNTY.

A new postoffice is established at the Cottonwood copper mines, called Azurite.

HUMBOLDT COUNTY.

The Morrison M. Co.'s property, 5 miles from Humboldt, will be developed this season.

LANDER COUNTY.

The Nevada Co. at Berlin has the 25-stamp mill in constant operation.

LINCOLN COUNTY.

The Nevada & New England M. C., with its mines and mill at Homestake, has closed down.

WASHOE COUNTY.

Thirty-one cars ore have been shipped from the Wedekind mine, near Reno, since July 17, 1900.

Eighteen men are employed at the mine at Bryan City, near Reno.

NEW MEXICO.

SIERRA COUNTY.

P. R. Smith of New York has bought the Charter Oak mill at Hillsboro.

OREGON.

JOSEPHINE COUNTY.

The Victor Jr. mine, C. W. Thompson Supt., near Leland, is working sixty men. The vein, which varies from 1 inch to 9 feet, is in diorite and is opened by four crosscut tunnels, the lowest of which is down 271 feet on the ledge. From this tunnel a shaft is now down 100 feet. The hoisting plant set in the tunnel is operated by compressed air. The 15-stamp mill is working thirty tons of ore daily.

SOUTH DAKOTA.

LAWRENCE COUNTY.

At Lead the Hidden Fortune M. Co. is organized; general manager, G. M. Nix, Deadwood, who proposes to develop the property and erect a 200-stamp mill.

Eight miles south of Deadwood the Custer Peak M. Co. will develop, near Custer's peak, property that shows free milling ore averaging $6 per ton gold in the slates. The company owns two mill sites and will erect a stamp mill this spring on Box Elder creek.

UTAH.

The total mine and smelter output of Utah mines for March aggregated in value $2,219,097.

Utah mines paid dividends amounting to $229,500 in March.

BEAVER COUNTY.

In the Horn Silver mine at Frisco a strike in new ground, 300 feet from the old workings on the 800-foot level, is reported. The ore carries copper.

IRON COUNTY.

The Ophir mill at Stateline, Manager Lathrop, will provide for the treatment of 100 tons daily, the ore to be handled entirely by gravity.

JUAB COUNTY.

The ore shoot from which the Eagle and Blue Bell at Eureka has been shipping is cut in the west drift from the winze 50 feet below the 350-foot level. The lead values are principally in sulphide. The east drift shows indications of the close proximity of ore.

SALT LAKE COUNTY.

The property of the New Mammoth M. Co. is now in possession of Michigan men, represented at Bingham by F. H. Lathrop. ——The Shawmut Co. has its electric power plant in operation—the first set of electric power drills ever in Utah.

The Bingham C. & G. M. Co. has bought control of the Grand Central mine. The price is said to be $1,200,000. This company treated in March 7960 tons of ore, producing about 1200 tons of matte worth about $120,000. Two furnaces were in

blast. The third furnace blown in will increase the daily tonnage to 450, with ore in sight to provide for it.

Work is to be resumed in La Reine, at Tintic; C. T. Allen manager.

The Sioux-Ajax tunnel, W. J. Craig manager, is to be opened. Several claims are to be prospected through it.

It is stated that the Centennial-Eureka and United States companies are to consolidate the two properties and that they have been examined to determine the terms.

The Dalton & Lark mines, at Bingham, are reported to have been sold for $750,000. Chicago parties are to operate the thirty-four claims making the property. The company is to be reorganized and extensive changes made, possibly a smelter to be built for the ores.

SUMMIT COUNTY.

The Daly-West, Park City, in March earned over $100,000, from which, after paying $45,000 dividends, over $20,000 was added to reserve. A. W. Mountney, assistant secretary, reports incline moving toward 1600-foot level from 1200, carrying an unbroken body of ore.

On the Steele Group, at Park City, the tunnel is in 300 feet on a lime and quartzite contact.——At the Comstock the 300-foot station has been completed and crosscutting for the vein commenced.——The Quincy mine has received two carloads of machinery.

TOOELE COUNTY.

The Mercur Miner reports not an idle man in the camp, all the mines working full-handed and full time.

The Con. Mercur Co.'s mill at Mercur treated during March 27,000 tons. F. Janney, Supt. of the mill, says that 65%—19,000 tons—was of sulphide ores. He says he prefers them as a milling proposition to the oxidized ores, finding results more uniform, owing to the roasting eliminating the refractory qualities, which would cause loss of values.——The Sunshine Co. have given an option upon their mine and mill for $300,000, of which $5000 was paid down. The purchasers propose beginning the work of reopening the mine and fitting up the mill without delay.——The control of the Ontario mine is reported to have been sold on a basis of $1,800,000 for the property.——The Camp Floyd Electric Co. has incorporated to furnish electric light to Mercur.

WASHINGTON.

FERRY COUNTY.

A contract is said to have been let for the construction of a smelter at Curlew, about 8 miles north of Republic.

The Quilp of Republic camp has so far shipped 194.3 tons, claimed to have a gross value of $6254. The average value would be about $36 per ton.

KITTITAS COUNTY.

Ellensburg reports that a gold nugget worth $1100 was found last week in the Hauten-McCauley mine, in the Swauk district.

OKANOGAN COUNTY.

R. Boettcher, manager Milwaukee-Okanogan G. M. Co., Weheville, has resumed work on the Fargo tunnel. He will also sink a shaft on the Lisbon.

PIERCE COUNTY.

The Montezuma M. Co., of Carbon river, say that the tunnel is now in 200 feet and the vein widening and increasing in richness.

STEVENS COUNTY.

The U. S. Supreme Court, in the case of the Mountain View claim, the first property staked on the north half of the Colville reserve, reverses the decision of the United States Court of Appeals and remands the case to the Stevens county Superior Court for trial. The question is whether a legal mineral location could be made on the reserve in advance of the President's proclamation. The suit has been in the local land office, to the Commissioner of Public Lands, to the Secretary of the Interior, back to the Superior Court, into the Federal Court, then to the Court of Appeals, later to the Supreme Court, and back again.

The Stella mine, near Blue creek, is being developed with a steam hoist and drill.

A deposit of iron at Valley has been opened and shipments will be made to the Tacoma smelter for use in fluxing.

The Golden Era M. Co. is soon to begin development on its property in the New Era district.

The United States Marble Co. of Valley announces a dividend; marble is shipped to Chicago.

FOREIGN.

BRITISH COLUMBIA.

At Rossland the War Eagle mine during 1900 shows the following values and smelter charges: Real or full assay value—total metallic contents at full New York quotations, $19.08; indirect smelting charge—difference between New York quotations and smelter's prices for the metals, $4.68; direct smelting charge—including freight from the mine, $6; total smelting charge — direct and indirect, $10.68; smelter's cross assay value—after deducting indirect charges only, $14.40; smelter's net value—after deducting both the indirect and direct charges from the real assay value (i. e., net value of ore f. o. b. cars at mine), $8.40.

The Le Roi mine, at Rossland, for the month ended Dec. 31, 1900, made shipments to the Northport Smelting Works as follows:

	Tons.
200-foot level	371.18
300-foot level	696.78
350-foot level	8.11
500-foot level	2,489.72
600-foot level	3,639.14
700-foot level	5,529.70
800-foot level	1,696.37
Total	14,431.00

7,743.19 ounces gold, at $20, $154,863.80, or $10.73 per ton; 15,550.14 ounces silver, at 60 cents, $9,330.08, or 65 cents per ton; 488,804 pounds copper, at 16½ cents, $80,652.66, or $5.59 per ton; making the total gross value $244.846.54 and the average value per ton $16.97.

The Granby smelter, at Grand Forks, by Sept. 1 will double its present capacity and will add 300 H. P. to its present power plant.

The Kootenay miners have sent a delegation to the Canadian Parliament to secure a bounty for the lead production similar to that given in Canada to steel production. A $5 a ton bonus is to be asked on all lead mined and refined in Canada.

The Arlington, Slocan, has shipped 1000 tons since January 1; output since October 1 last, 2300 tons, valued at $124,000.

MEXICO.

S. J. Sullivan, manager Santo Domingo mine of the Chihuahua M. Co., has his 200 tons daily of sulphides treated by the Guggenheim plant. He and nine others have bought 200 acres of mining land adjoining the Santo Domingo, paying $260,000 cash.

Boston capital is reported to have bought the Santa Rosa mine in Sonora. It is an old mine with five veins from 2 to 16 feet wide. The new owners have started a shaft which they propose to sink to 150 feet and crosscut from to explore the veins.

At the San Francisco mine, J. C. Underwood manager, at Llano, Sonora, new machinery is being erected, and a cyanide plant is under consideration to work accumulating tailings.

SOUTH AFRICA.

The total gold output of companies making returns to the Rhodesia Chamber of Mines for the month of February amounts to 12,237 ounces, an increase of 1450 ounces as compared with the previous month, and an increase of 6004 ounces as compared with the corresponding period of 1900.

About 400 stamps are in present operation at Johannesburg.

The military authorities have given permission for four of the Rand mines to reopen, provided no higher rate of wages is paid than the soldiers are receiving, 5 shillings and rations.

Recently Declared Mining Dividends.

	Payable.
Calumet & Hecla M. Co., Michigan, $15 per share	Mar. 29
Crœsus (Plumbago) M. Co., California, $12,000	April 1
Bankers G. M. & M. Co., Colorado, 15 cents per share, $167,500	April 5
Bunker Hill & Sullivan M. & C. Co., Idaho, $21,000	April 4
Garfield Con. G. M. Co., Colorado, 10 cents per share, $125,000	April 5
Mammoth, Utah, 5 cents per share, $20,000	April 8
Swansea, Utah, regular monthly 5 cents per share, $5000	April 10
Silver King, Utah, regular $100,000	April 10
Anaconda Copper M. Co., Montana, $1.25 per share, and extra 75 cents per share	April 27
St. Eugene Con. M. Co., Ltd., British Columbia, quarterly 3% on paid-up stock	April 1
Center Star, British Columbia, regular 1 cent per share, $35,000	April 1
Independence, Colorado, first quarterly (1901), $181,375	April 1

Books Received.

"Steam Boiler Economy," a treatise on the theory and practice of fuel economy in the operation of steam boilers, 8vo, 458 pages, 126 illustrations; Wm. Kent. The subject is treated in a practical way and with an intelligence, personal experience and knowledge of the subject that would make the work of value to any one interested in the subject. Published by John Wiley & Sons, New York City; price $4.

Personal.

P. J. CIRKEL of Minneapolis, Minn., is visiting Utah.

D. G. LINARES has returned from Old Mexico to Victor, Colo.

LOUIS JANIN has returned to San Francisco from Grass Valley, Cal.

WM. A. CHURCH is inspecting the Shannon mine, near Safford, Ariz.

G. B. EARNSHAW has resigned as Supt. Shawmut M. & M. Co., Bingham, Utah.

I. TRUMBO has resigned the receivership of the Golden Cross M. Co., Hedges, Cal.

JOHN L. SCARLETT of London, Eng., is examining property in West Fisher, Mont.

G. B. EARNSHAW, Supt. Shawmut M. & M. Co., at Bingham, Utah, has resigned.

B. LANGRIDGE has been appointed consulting engineer of the B. & M. mine, Ward, Colo.

N. O'BRIEN, from Virginia City, Mont., is elected manager Fisher Creek M. Co., Libby, Mont.

W. J. BEAGER, formerly of Butte, Mont., is now manager American Kootenai and Mother Lode mining companies, Libby, Mont.

G. S. PITCAIRN, metallurgical engineer of the Tharsis Co. of Spain, is visiting Clifton, Arizona.

GEO. H. JONES has accepted the superintendency of the Keystone Co., Gold Mountain, Utah.

J. F. BEITMAN, M. E., is examining copper deposits in Unaweep canyon, Montrose county, Colo.

B. STANLEY REVETT goes this week to the west coast of Mexico to examine placer mines there.

F. S. ROUMAGE is in Atlin, B. C., superintending the installation of a large hydraulic mining plant.

R. A. PARKER, M. E., has changed his address from 8 Congress St. to 4 P. O. square, Boston, Mass.

A. HAUMAN has gone from San Francisco to Las Animas mine, near Sonora, Mexico, as metallurgist.

W. W. TINER of Placer county, Cal., will shortly return from an extensive placer mining reconnoissance in Siberia.

WM. MOOREHEAD, formerly Supt. Dreisam mine, Tuolumne county, Cal., is now Supt. Yellow Aster, Randsburg, Cal.

ARTHUR WILLIAMS, formerly of the Mercur mill, is to take charge of the Century Co.'s plant in Park valley, Utah.

J. Q. MCDONALD, manager National mill, Florence, Colo., has similar position at the new sampler of the Cripple Creek Co.

CHAS. W. PAULY succeeds I. Trumbo as receiver Golden Cross M. Co., at Hedges, Cal., with bond fixed by the court at $25,000.

J. E. SPURR of the U. S. Geological Survey has gone to Turkey, under a special commission from the Turkish Government.

R. B. ESTEY AND NORMAN ESTEY have resigned as manager and general superintendent, respectively, of the Rialto M. Co., Leadville, Colo.

JESSE J. MACDONALD has again taken up the California and Arizona agency of Gold & Silver Extraction Co. of America, Ltd. His headquarters will be 128 North Main street, Los Angeles, Cal.

F. H. RICHARDS succeeds C. L. Vawter as U. S. Marshal of Alaska, second division. His jurisdiction will extend over the second division of the Alaska district, which comprises northwestern Alaska, taking in Dutch Harbor, Unalaska, the Kuskokwim and from the headwaters of the latter river to the Arctic, including the Koyokuk. His official headquarters will be at St. Michael, but he will spend most of his time in Nome.

Trade Treatises.

Advance Sheet No. 9 of the Jeanesville Iron Works Co., Jeanesville, Pa., gives minute detailed attention to working data on steam pumps; tabular data of value to steam pump users.

The A. Van Der Naillen School of Practical Engineering—a well-written practical and finely illustrated treatise on the scope of the school's work, with several pages of testimonials from former pupils; sent on application to the new address, 113 Fulton St., San Francisco, Cal.

List of U. S. Patents for Pacific Coast Inventors.

REPORTED BY DEWEY, STRONG & CO., PIONEER PATENT SOLICITORS FOR PACIFIC COAST.

FOR THE WEEK ENDING MARCH 26, 1901.

670,525.—FRUIT PACKING DEVICE.—C. W. Arrasmith, Courtland, Cal.
670,602.—SHINGLE MACHINE—D. F. Baker, Mt. Tabor, Or.
670,526.—SLED PROPELLER—A. M. Banks, Tacoma, Wash.
670,757.—ANIMAL TRAP—J. W. Barnes, Beaverton, Or.
670,578.—STARTING GATE—T. Barnett, S. F.
670,833.—RURAL SIGNAL DEVICE—F. C. Bates, S. F.
670,658.—ARC LAMP—E. A. Beck, Los Angeles, Cal.
670,839.—DRAFT EQUALIZER—W. C. Campbell, Vashon, Wash.
670,537.—WAVE MOTOR—E. P. Couture, Gualala, Cal.
670,445.—BELT LACING NEEDLE—N. M. Cripe, Elma, Wash.
670,632.—SEAMING MACHINE—W. F. Davis, S. F.
670,418.—SINK—J. A. Duffy, Pomona, Cal.
670,707.—WALL CONSTRUCTION—Fisher & Brouse, S. F.
670,560.—VEHICLE BRAKE—O. Heylmann, Fallbrook, Cal.
670,561.—SHOE LACE CLASP—E. B. Hoegemann, Oakland, Cal.
670,715.—BICYCLE GEAR—Mahana & Pompe, Toledo, Wash.
670,620.—HOP DRIER—J. K. Mount, Silverton, Wash.
670,640.—DOOR HANGER—A. Newell, Pasadena, Cal.
670,807.—AIR SHIP—O. Olsen, Oakland, Cal.
670,543.—VEHICLE GEAR—H. Paulsen, Tacoma, Wash.
670,815.—GAS GENERATOR—W. G. Ross, Benicia, Cal.
670,545.—VAPOR BATH—M. Rostovsky, S. F.
670,457.—FRUIT BRUSHER—H. B. Ruggles, Redlands, Cal.
670,435.—HARNESS—W. F. Schatz, San Diego, Cal.
670,548.—FIRE ESCAPE—W. H. Sliger, McMinnville, Or.
670,521.—VOTING MACHINE—St. Louis & Barceloux, Willows, Cal.
670,544.—STAMP MILL—L. R. Tulloch, Angels Camp, Cal.
670,825.—LETTER BOX—W. L. Vestal, San Bernardino, Cal.
670,652.—EYEGLASSES—H. F. Wallace, Los Angeles, Cal.
670,908.—POWER TRANSMITTER—F. S. Weatherly, Los Angeles, Cal.

Notices of Recent Patents.

Among the patents recently obtained through Dewey, Strong & Co.'s SCIENTIFIC PRESS U. S. and Foreign Patent Agency, the following are worthy of special mention:

SHOE LACING CLASP.—No. 670,561. March 26, 1901. E. B. Hoegemann, Oakland, Cal.

This invention is designed to secure shoe lacings without tying. It consists of two spring-actuated circular jaws having concentric rows of teeth adapted to register, and means by which the device may be secured to the shoe so that these parts being hinged at one side may be closed to clamp and lock the strings between the serrated meeting edges.

FRUIT PACKING DEVICE.—No. 670,525. March 26, 1901. C. W. Arrasmith, Cortland, Cal.

This invention is designed to facilitate the packing of fresh fruits, such as berries, cherries, etc. It consists of a framework having an opening in which is a concaved slidable bottom with means for adjusting and holding the same; means for holding a fruit receptacle inserted above and covering this opening so that the concaved bottom being first filled with the fruit to form the crown the remainder is filled through the bottom of the box, which is afterwards permanently closed, and the device being inverted the basket is released, and is ready for market with the proper symmetrical crown of fine looking fruit.

RURAL SIGNAL DEVICE.—No. 670,833. March 26, 1901. F. C. Bates, San Jose, Cal., assignor of one-half to W. G. Hawley, same place.

This invention is designed for use in rural or suburban districts for the purpose of notifying grocers, butchers, etc., when they are desired to call at any house on the route. It consists of boards carried in a suitable frame having printed

upon them the names of the different articles that may be wanted, as meat, groceries, fish, etc., and if desired the name of the particular tradesman whom the residents desire to call. Hinged flaps are so disposed that any or all of these signs may be normally covered, but when either article is desired the flap is turned up or down so as to expose the same and the passing tradesman will thus be notified that he is wanted at the house.

Obituary.

JOS. MOORE, prominent in the history of Pacific coast mechanical industry, died in London, Eng., on the 31st ult. Deceased was a native of Scotland, came to California in 1849 and for a generation was among the foremost California mechanical engineers, several of his inventions and appliances being of intimate connection with the mining industry of the country. His inventive genius and mechanical skill were of value to his adopted country, and his four sons now occupy deserved prominence; the eldest, Andrew, is manager Padhua plantation, Hawaii, U. S. A., the youngest son, Joseph, being assistant superintendent there; the second son, Mr. Robt. S. Moore, is manager of the Risdon Iron & Locomotive Works, San Francisco; the third son, Ralph, is manager Spreckels Sugar Refinery, San Francisco. Mr. Moore was a good type of the vigorous brain and body that brought value to the Pacific coast; his long and useful life is an inspiration to those who follow him.

Commercial Paragraphs.

THE Robt. Aitchison Perforated Metal Co. of Chicago, Ill., have closed a contract which will require sixty tons of sheet steel.

THE Baker Iron Works, Los Angeles, Cal., have added the Laidlaw-Dunn-Gordon air compressor to their lines of machinery. They have a contract with the Upland Water Co., North Ontario, Cal., for a steam pumping plant.

THE Risdon Iron Works, San Francisco, has a contract for four 5-foot dredgers for California, two in Oroville and two in Bear river, the contract aggregating $200,000, which is considered the largest reported in that line. The Risdon Iron Works is now building six of these machines.

THE Paraffine Paint Co., of San Francisco and Los Angeles, Cal., has a plant for the refining of crude oil, at Emeryville, Cal., of three 60-barrel stills with a tankage of 4000 barrels. The crude product has an average specific gravity of 19°; the distillates produced range from 15° to 52°. The products are benzine, coal oil, neutral oil for paint mixtures and for light lubrication, green oil for heavy machinery, and asphaltum, the latter about 22% of the entire volume of the crude oil. The refinery consumes fifteen cars of crude oil per month, shipped by rail from McKittrick, Cal.

THE Keystone Driller Co. of Beaver Falls, Pa., have an order from W. P. Hammon of Oroville, Cal., for two No. 2 traction placer-testing Keystone drillers. Mr. Hammon has had several of these machines in use for the last two or three years in testing placer ground before installing a dredger. They have proved a great saving in testing the ground—the expense being small compared to that of sinking shafts. The use of these machines has made it possible in many places to put down holes and test the ground where it would have been almost impossible to sink a shaft on account of water, etc.

H. D. CRIPPEN, sole licensee and manufacturer of the Jackson hand-power rock drill, 52 Broadway, New York, is desirous of having a collection of photographs showing the Jackson drill in operation in various mining properties. These photographs he intends to use for illustrating in his next catalogue and in a general advertising way. The merit of the photograph will be judged by clearness and the advantage to which it shows off the Jackson drill from a practical standpoint. The drill is to be shown in apparent operation, the operator or operators in a working position. Photo may be taken of the drill in either shaft, tunnel or stope. The contest is not limited to owners of a drill, but complete data as to the name and location of mine and the owner thereof must accompany each photograph. Award will be made on June 1st, 1901. There will be a prize of $50 for the best flashlight photograph under the conditions stated.

Latest Market Reports.

SAN FRANCISCO, April 4, 1901.

SILVER.—Per oz., Troy: London, 26 5/16d (standard ounce, 925 fine); New York, bar silver, 58⅝c (1000 fine); San Francisco, 58⅝c; Mexican dollars, 49½c San Francisco, 48½c New York.

COPPER.—New York: Lake, 1 to 3 casks, $17.25; carload lots, $17.00; Electrolytic, 1 to 3 casks, $16.75; carload lots, $16.50; Casting, 1 to 3 casks, $16.75; carload lots, 16.62½. San Francisco: 18. Mill copper plates, 20c; bars, 22@23c. London: £68 12s per ton.

LEAD.—New York, $4.42½; Salt Lake City, $4.00; St. Louis, $4.22½; San Francisco $5.00, carload lots; 5½c 1000 to 4000 lbs.; pipe 6¾, sheet 7½, bar 6c; pig, $4.70 @5.10. London, £13 5s per ton=2.87½ cents per lb.

SPELTER. — New York, $4.20; St. Louis, $3.75; London, £16 10s per ton =3.58½ cts. per lb; San Francisco, ton lots, 5½c; 100-lb lots, 6c.

ANTIMONY.—New York, Cookson's, 10c; Hallett's, 9c; San Francisco, 1000-lb lots, 12c; 300 to 500 lbs., 13@14c; 100-lb lots, 15@18c.

IRON.—Pittsburg, Bessemer pig, $17.25; gray forge, $16.50; San Francisco, bar, per lb., 2.65c in small quantities.

STEEL.—Bessemer billets, Pittsburg, $24; open hearth billets, $27.00; San Francisco, bar, 7c to 12c per lb.

TIN.—New York, pig, $26.00; San Francisco, ton lots, 29c; 1000 lbs., 29½c; 500 lbs., 29½c; less, 30c; bar tin, ℔ lb, 35c.

QUICKSILVER. — New York, $51.00 large lots; London, £9 2s 6d; San Francisco, local, $47.00 ℔ flask of 76½ lbs.; Export, $45.00

MAGNESIUM.—New York, $2.90 ℔ lb. San Francisco, $3.75.

ZINC.—San Francisco, 5½c; slab, 5¾c bar, 7c; zinc dust, N. Y., 8c.

BABBITT METAL.— San Francisco, No. 1, 10c.

SOLDER. — Half-and-half, 100-lb. lots, 18½c; San Francisco, Plumbers', 100-lb. lots, 15½c.

ASSAY LITHARGE.—San Francisco, 10c ℔ lb, small lots.

BISMUTH.—New York, ℔ lb., $2.25 50-lb lots; San Francisco, $2.50 to $2.75 lt lots.

PLATINUM.—San Francisco, crude, $18 ℔ oz.; New York, $18.20 per Troy oz

ALUMINUM.—New York, No. 1, 99% pure ingots, 35c; No. 2, 90%, 30c to 35c.

FERRO-MANGANESE. — Pittsburg, 80%, domestic, $62.50, large lots.

TUNGSTEN.—New York, ℔ lb., 95c; San Francisco, $1.15.

FERRO-TUNGSTEN. — New York, 37%, 32c; San Francisco, 65c (60%).

NICKEL.—New York, 50@60c ℔ lb.

PHOSPHORUS.—F. o. b. New York 50@60c ℔ lb.

POWDER.—F. o. b. San Francisco: No. 1. 70% nitro-glycerine, per lb., in carload lots, 15½c; less than one ton, 17½c. No. 1*, 60%, carload lots, 13½c; less than one ton, 15½c. No. 1** 50%, carload lots, 11½c; less than one ton, 13½c. No. 2, 40%, carload lots, 10c; less than one ton, 12c. No. 2* 35%, carload lots, 9½c; less than one ton, 11½c. No. 2** 30% carload lots, 9c; less than one ton, 11c. Black blasting powder in carload lots, minimum car 728 kegs, $1.50 per keg; less car lots, $2 per keg.

CAPS.—3x, $5.50 per 1000; 4x, $6.50; 5x, $8; Lion, $9, in lots not less than 1000.

FUSE.—Triple tape, $3.60 per 1000 feet; double tape, $3.00; single tape, $2.65; Hemp, $2.10; Cement No. 2, $3.00; Cement No. 1, $2.65, in lots of 3000 feet and up.

CANDLES.—Granite 6s, 16 oz., 40s., 11½c ℔ set; 14 oz., 40s., 10c.

CHEMICALS.—Cyanide of potassium, 98%–99%, jobbing, 32½@33½c ℔ lb.; carloads, 30@31c; in 10-lb. tins, 40c; sulphuric acid, in carboys, 66% B, 2c ℔ lb.; soda ash, $1.90 ℔ 100 lbs. 58%; hyposulphite of soda, 2¾@3c ℔ lb.; blue vitriol, 5¾@6½c ℔ lb.; borax, concentrated, 7@8c ℔ lb.; chlorate of potash, 12@13c; roll sulphur, 6c; alum, $1.90@2.00; flour sulphur, French, 2¼@2½c; California refined, 1¾@2c; nitric acid, in carboys, 8c ℔ lb.; caustic soda, in drums, 3@4c ℔ lb.; Cal. s. soda, bbls., $1.00; sks, 95c ℔ 100 lbs.; chloride of lime, spot, $2.50@2.60; nitrate of potash, in kegs, 8c; caustic potash, 10c in 40-lb. tins.

OILS.—Linseed, pure, boiled, bbl., 75c; cs., 80c; raw, bbl., 73c; cs., 78c. Deodorized Stove Gasoline, bulk, 14½c; do., cs., 20½c; 86° Gasoline, bulk, 20c; do., cs., 26c; 63° Naphtha or Benzine, deodorized, in bulk, per gal., 13½c; do., in cs., 19½c; Lard Oil, Extra Winter Strained, bbl., 75c; cs., 80c; No. 1 bbl., 50c; cs., 55c. Neatsfoot Oil, coopers' bbls., 60c; cs., 65c; No. 1 bbl., 50@52½c; cs., 55@57½c.

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Strictly Modern.

Little Used.

Built by Fraser & Chalmers.

ANY PART OF THIS MILL WILL BE SOLD.

This 20-stamp mill is located at Ohio City, about 25 miles east of Gunnison, Colorado. We are dismantling this mill for shipment to Denver and will quote prices on any part of the mill f. o. b. cars Ohio City, Colorado, and guarantee to make prompt shipment. The construction of the mill was of the best, both in machinery and buildings. The total cost of machinery and buildings, which we have bought, was $130,000.00. Why was it sold? Simply another case of a mill without a mine. All correspondence should be addressed to our Denver office.

20 STAMPS. 850-lb. rapid drop, complete with frames.
2 BOILERS, 44 in. x 12 ft.; 30 3½ in. flues.
2 BOILERS, 44 in. x 12 ft.; 34 3 in. flues.
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NO. 5 KNOWLES PUMP, 7x4½x10.
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2 MEECH SYNDIACTORS, new.
2 MEECH AMALGAMATORS.
3 MEECH SETTLERS.
HOWELL IMPROVED WHITE ROASTING FURNACE, 60 in. x 27 ft.
BANCROFT PULVERIZER, 40-ton.
REVOLVING ORE DRYER (F. & C.), 42 in. x 18 ft.
6 AUTOMATIC ORE FEEDERS.
1 RETORT AND BULLION FURNACE.
EXTRA STAMP AND FEEDER REPAIRS.
250 FT. SHAFTING, 4 7-16, 3 15-16, 2 15-16 dia.
1200 FT. RUBBER BELTING, 18, 16, 14, 12, 10, 6 and 4 in. widths.
4 CONVEYOR BELTS, with buckets attached.
50 IRON PULLEYS, BOXES, AND HANGERS.
10-TON FAIRBANK WAGON SCALE.
3000-LB. FAIRBANK DORMANT SCALE.
WOOD TANK, 8x8x3 FT.; IRON TANK, 6x6 FT.
1000 IRON PIPE FITTINGS AND VALVES.
40 000 FT. WROUGHT IRON PIPE.
SMALL TOOLS, ASSAY MATERIAL, SAMPLING MATERIAL, INCLUDING NO. 2 MILL, OILS, GREASE, CEMENT, Etc., Etc.

The mills contain about 200,000 feet of LUMBER. They will be sold as they stand, or f. o. b. cars. They have got to be taken down.

We have other Mills: Concentrating, Stamp, Cyanide, Reduction Works, etc., etc.

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A Bruckner Roaster, 8'6"x26'6", with fire-box complete; also Chlorinating Barrel, 5'x9'.

Machinery new, never having been set up. Will sell at a discount f. o. b. Denver.

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FOR SALE.

A Large Group of Silver-Lead Properties in British Columbia.

18 Months' Bond. Easy Payments.

Five Separate Leads, All Carrying Ore.

For assays and other particulars, write HOPE, GRAVELEY & CO., 536 Hastings St., Vancouver, British Columbia.

Annual Meeting.

The Regular Annual Meeting of the Stockholders of the CHAMPION MINING CO. will be held at the office of the Company, 113-114 Crocker Building, San Francisco, California, on TUESDAY, the 9th day of April, 1901, at the hour of 2 o'clock P. M., for the purpose of electing a Board of Directors to serve for the ensuing year, and the transaction of such other business as may come before the Meeting.

Transfer Books will close on SATURDAY, March 30, 1901, at 12 o'clock noon.

B. N. SHOECRAFT, Secretary.

Office—113-114 Crocker Building, San Francisco, California.

Special Meeting.

OXFORD BETA TUNNEL AND MINING Company.—There will be a special meeting of the stockholders of the Oxford Beta Tunnel & Mining Company, to be held at the office of the company, No. 135 Geary St., Room 111, San Francisco, at the hour of 4 o'clock P. M., on the 4th day of June, 1901, for the purpose of increasing the capital stock of the company from twenty-nine hundred shares of the value of one hundred dollars each to one hundred thousand shares of the value of two dollars and fifty cents each. W. H. KNIGHT, Secretary.

FRENIER'S SPIRAL PUMP.

For Elevating Tailings, Slimes, Battery Sands to Jigs, Etc.

NO VALVES.
NO BUCKETS.

Circulars Free.

Agents: GATES IRON WORKS, Chicago, Ill.; STEARNS-ROGERS MFG. CO., Denver, Colo.; M. S. HAUSER, 304 Montgomery St., San Francisco, Cal. **FRENIER & SON, Rutland, Vt.**

THE CALIFORNIA DEBRIS COMMISSION, HAVing received applications to mine by the hydraulic process from F. C. LeBlond and W. E. Olmstead, in the Chaparral Hill Mine, near Downieville, Sierra Co., to deposit tailings in Goodyear Creek; from Ah Lung, in the Fuller Flat Mine, near Scales, Sierra Co., to deposit tailings in Canyon Creek; from J. H. Skinner, in the Lava Point Mine, at Hepsidam, Sierra Co., to deposit tailings in Whiskey Creek; from J. W. Dempsey, in the Hungarian Hill Mine, near Quincy, Plumas Co., to deposit tailings in Whiskey Creek; and from J. S. Carter and Wm. Deal, in the Cadmus mine, at head of Peters Creek, Plumas Co., to deposit tailings in Peters Creek, gives notice that a meeting will be held at Room 59, Flood Building, San Francisco, Cal. on April 15 1901, at 1:30 P. M.

A HARD TEST.

Cincinnati, Ohio, U. S A.

Burt Mfg. Co., Akron, Ohio.

Gentlemen:—We have tested the filter, running through some of the very rank oil that comes from our spindle borings and automatic screw machines, and find it all right, and you will please forward six (6) more at once as per our understanding. Very respectfully, The Lodge & Shipley Machine Tool Co.—Wm. Lodge.

There's no test too hard for the **CROSS OIL FILTER.** We guarantee to save you 50% on your oil bills. Why not try it for 30 days. If not all we say, send it back at our expense.

THE BURT MFG. CO., Akron, Ohio, U. S. A.

Largest Mfrs. of Oil Filters in the World.

We also manufacture the BURT EXHAUST HEAD.

SOLAR HOUSE LIGHTS

For houses not having gas or electric light service, and for those that have, but wish economy and independence.

Costs $4.00 Per Light

EACH LIGHT LASTS A LIFETIME

Gives a steady light, brilliant as electricity, and whiter. Excels any town gas service in existence. No complications; nothing to get out of order. Simple as A, B, C. Handy as a "candle"—jets can be carried around anywhere in the house. Gas cannot escape, like from the town mains. No smell, no smoke and no danger, as with kerosene or gasoline. No accident of any kind possible, and the whitest, steadiest and richest light that is known.

Write us for particulars.

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Peroxide of Sodium

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And Other Chemicals for Mining Purposes.

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Drawings, Specifications, for Ore Reduction Plants.

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UNION IRON WORKS,

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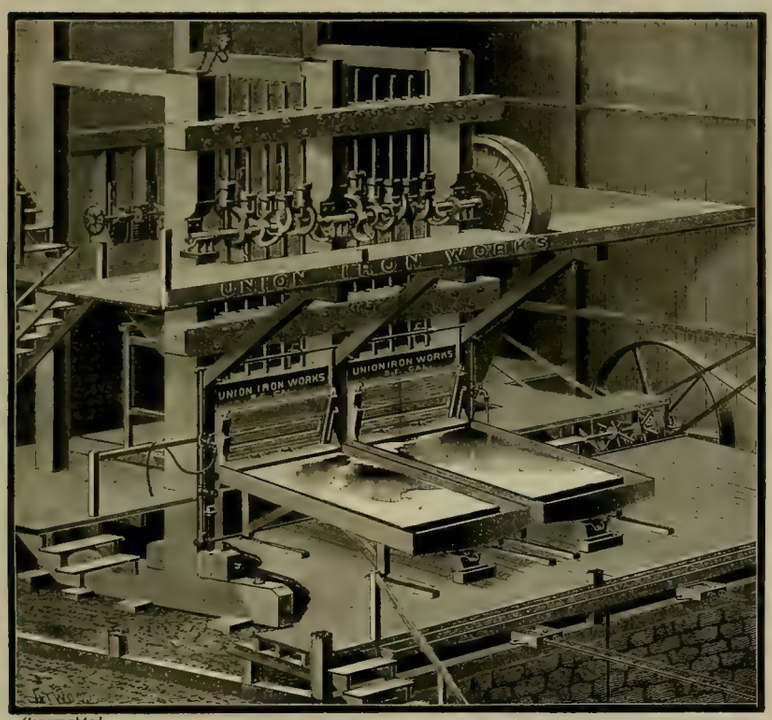
MODERN TEN-STAMP BATTERY.



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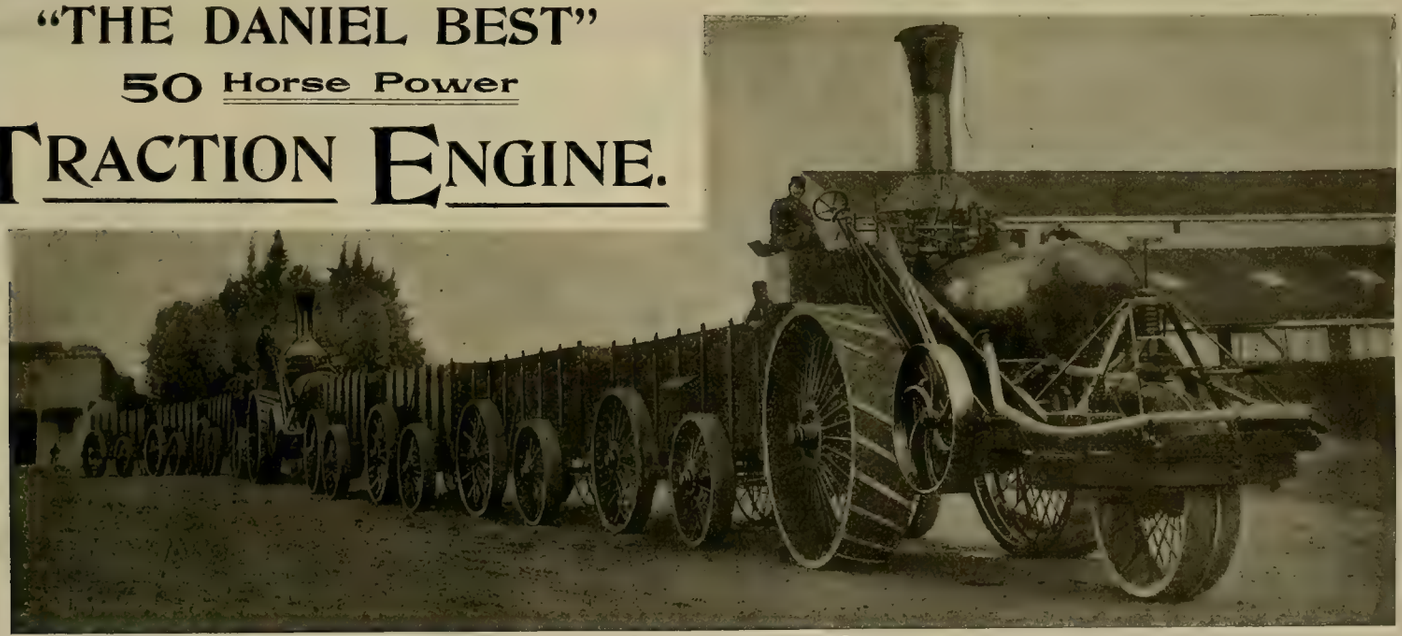
The illustration shows the details of a modern 10-stamp battery of the back-knee type, driven by belt and tightener from a shaft located upon the battery frame sills below the mortars and plainly illustrates not only the battery and its various parts, but also shows the ore-bin gate, feeders, copper apron plates and water piping, all in their relative positions.

SEND FOR CATALOGUE NO. 5.

"THE DANIEL BEST"

50 Horse Power

TRACTION ENGINE.



FREIGHT CARRYING CAPACITY OF WAGONS, 16 TONS EACH, OR A TOTAL CAPACITY OF TRAIN, 48 TONS.

Capacity of Engine, 50 HORSE POWER.

Over One Hundred of these Powerful Engines in use on this Coast in the principal Logging and Lumbering Camps and for general freighting purposes. EVERY ONE A SUCCESS AND MONEY MAKERS.

These outfits are particularly adapted to haul freight of any description from out-of-the-way places, and will reduce the cost of transportation at least one-half and in many instances two-thirds. They can generally be worked where animal teams now do the work, and haul their immense loads of from thirty to fifty tons, ascending and descending grades as much as 5 per cent to 30 per cent, depending upon condition of the road; loads may be increased to even greater amount on a firm and moderately level road.

Send for Descriptive Circulars and Price List. Wagons are built which are best suited for the kind of freight to be handled.
Estimates made for complete Steam Freighting Outfits. Address

THE BEST MANUFACTURING COMPANY,
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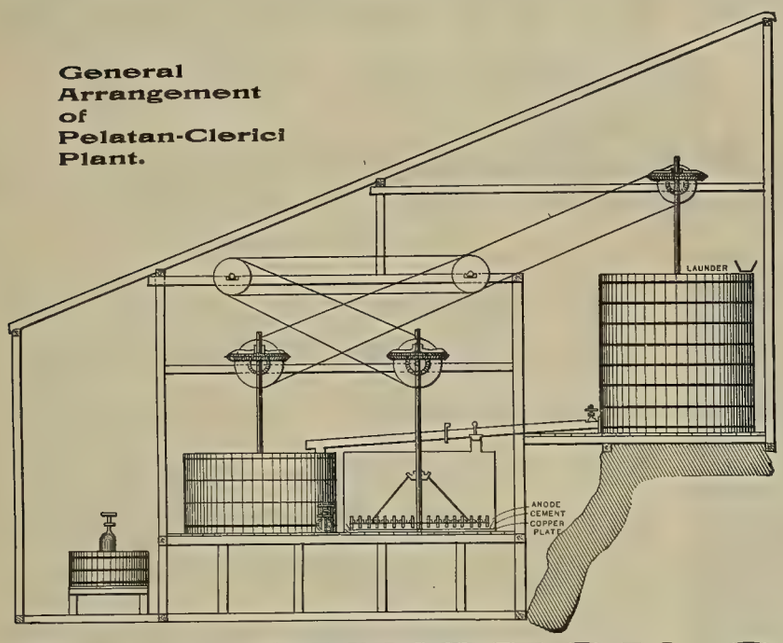
OF TREATING REFRACTORY ORES

General Arrangement of Pelatan-Clerici Plant.



Saves the precious metals by the simplest, most economical and most efficient process known. No roasting or previous treatment, except ordinary crushing. Extraction complete in from 6 to 12 hours. Extracts equally well both fine refractory gold and coarse gold in the form of amalgam. Makes a greater saving of gold than any other process from raw material at less cost. The electric current and dissolving agent promptly dissolve the precious metals, both gold and silver. Samples of ore tested free of charge. Several mills saving over 90 per cent of values by bullion returns. Simplicity. Economy. Efficiency.

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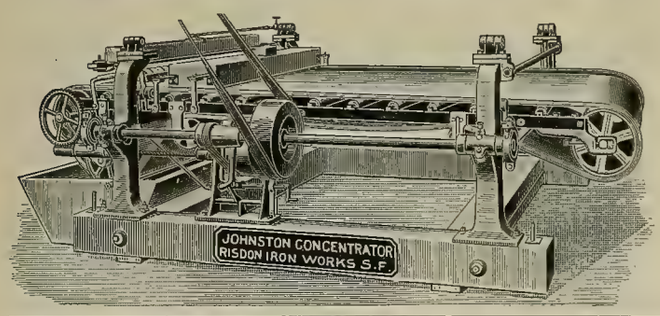
THE RISDON IRON WORKS,
SAN FRANCISCO, CAL.
AGENTS.

The JOHNSTON CONCENTRATOR.



DURABILITY, CAPACITY AND SIMPLICITY : : ARE ITS ESSENTIAL POINTS. : :

SAVES MORE VERY FINE SULPHURETS THAN ANY OTHER CONCENTRATOR MADE.

The Johnston Concentrator is slung with arms from above on an angle, giving it the oscillating motion that makes it a perfect machine. This undulating motion immediately settles the sulphurets, retaining all amalgam, leaving sulphurets very clean, one 6-ft. Johnston doing the work of two 4-ft. belt machines.

Send for Catalog No. 14. **Risdon Iron Works,**
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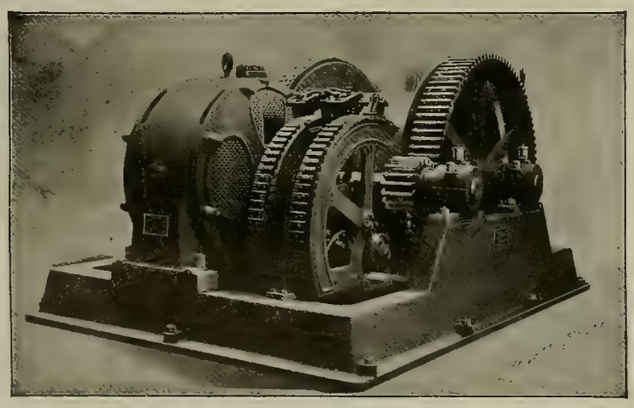

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Operate in nearly all Principal Mines.

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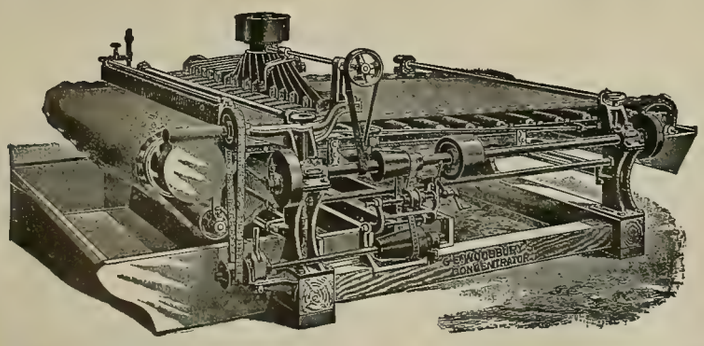

THIS Concentrator is superior to any other Belt Machine. It has an iron frame, steel shaking frame, and built in the most thorough manner. The patent distributing device distributes the pulp evenly over the whole working surface of the belt; thereby it enables the machine to perform perfect work, and giving more capacity to the Concentrator than any other Belt Machine. The variable eccentric crank gives the machine greater capability to work different classes of ore. I will warrant this machine as having more capacity than any other Concentrator.

Simple in Its Construction - Saves Fine Sulphurets - Without Loss in Tailings - Makes High Product - Capacity from 5 Stamps

Send for Catalogue. **GEORGE E. WOODBURY,** 223 FIRST ST., SAN FRANCISCO, CAL. 'Phone Main 1766.

GATES IRON WORKS

The Copper Furnace herewith reproduced is one of two sold to the GRANBY CONSOLIDATED MINING AND SMELTING CO., LTD., BRITISH COLUMBIA. The size is 44x160 inches. These two furnaces were sold on a guaranteed capacity of 500 tons per day. Before the furnaces had been in operation a month they developed an average capacity of 600 tons per day, and the highest daily record has exceeded 735 tons. The cost of operation has steadily declined under the management of General Manager Hodges, until six-dollar copper ore is paying a handsome profit.

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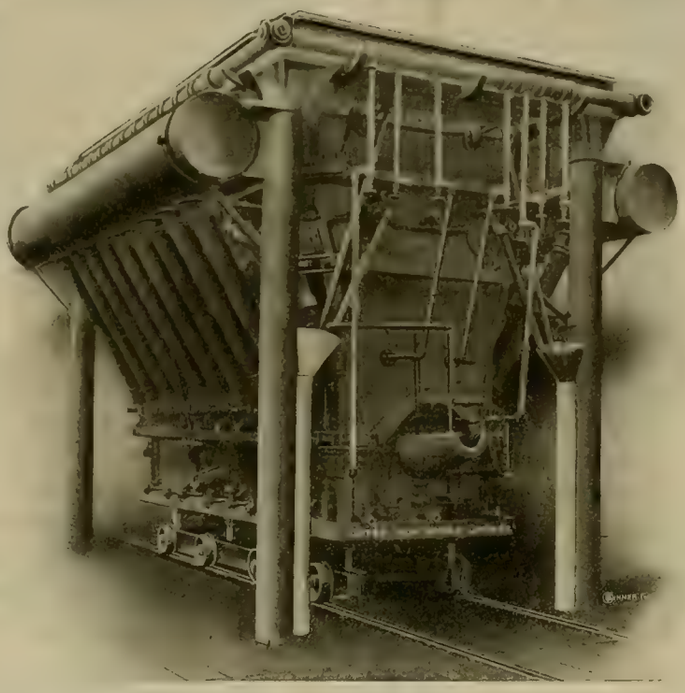

All of GATES IRON WORKS machinery is as good as it is represented to be, and often much better. We build every modern type of apparatus for the reduction of the precious ores by every established process. Our three great lines are these:

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Great Variety **FOR MINING PURPOSES** Operated by

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Vertical SINKING PUMPS, Bucket or Double Plunger Pattern.
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MAKE KNOWN YOUR WANTS TO THE : : :

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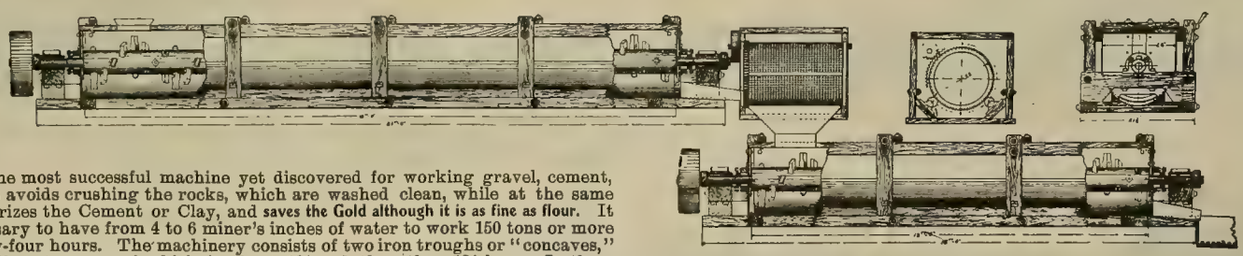
Successors to the DOW STEAM PUMP WORKS. SEND FOR CATALOGUE. SAN FRANCISCO, CAL.

THE SNODGRASS COMMON SENSE PULVERIZER AND CONCENTRATOR.



This is the most successful machine yet discovered for working gravel, cement, clay, etc. It avoids crushing the rocks, which are washed clean, while at the same time it pulverizes the Cement or Clay, and **saves the Gold although it is as fine as flour.** It is only necessary to have from 4 to 6 miner's inches of water to work 150 tons or more every twenty-four hours. The machinery consists of two iron troughs or "concaves," each 26″ in diameter, one of which is about 18′ and the other 12′ long. In these troughs are strong revolving shafts with projecting teeth, made of White Iron, 2¾″ wide by 1¼″ thick, placed in spiral form around the shaft about 2″ apart, forming a conveyor. The first shaft is geared to make from 150 to 250 revolutions per minute, and the second one from 300 to 500. There is a revolving screen between the two troughs that takes out the coarser rocks after being washed, and only the finer material runs into the second trough, and is there worked thoroughly. There is a space of about 4″ in the bottom of each trough, or "concave," that fills up with gravel and sand. When the gold is free it settles into this, and as the teeth do not disturb the bottom, the gold remains there until a cleanup is made. In many cases the 18′ machine alone is needed, as the two are only used where we have hard Cement or Clay to work. It requires from 10 to 12 H. P. to run the complete machine, and from 6 to 8 H. P. for the 18′ one alone. I also manufacture a 6′ machine about one-half the diameter of the others, and lighter in proportion, to be run by hand power, with small amount of water, and capacity of about two tons per hour. This can be easily moved from place to place.

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Calkins' Umpire Ore Sampler.

PAT. APPLIED FOR.

An accurate, quick and absolutely impartial machine for sampling ore in quantities of from one to one hundred pounds. Easily operated and cleaned. No danger of salting subsequent samples. Makes the operation of sampling an easy one; and all competent assayers know that to obtain an assay sample by hand requires more trouble and time than is necessary to reduce the resultant sample to the pulp. Diagonally opposite portions are taken each time; and assay samples are obtained with this machine in less time and with less trouble than by any other method.

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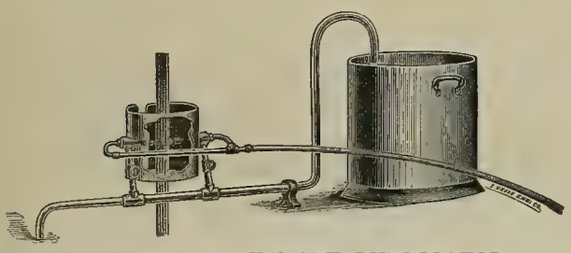
Double the Life of Flat Hoisting Ropes by Using

JOHNSON'S WIRE ROPE LUBRICATOR.



JOHNSON'S WIRE ROPE LUBRICATOR.
Patent Applied for.

Lubricating compound forced into the rope by compressed air under high pressure.

One hundred feet of rope thoroughly saturated to the very center in one minute.

NO USER OF FLAT ROPE CAN AFFORD TO BE WITHOUT THIS MOST VALUABLE DEVICE.

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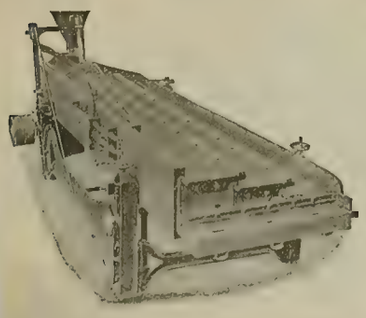

The only table made that will take the place of jigs and do away with costly and complicated machinery.
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Solid Iron Tops, planed to a true surface.
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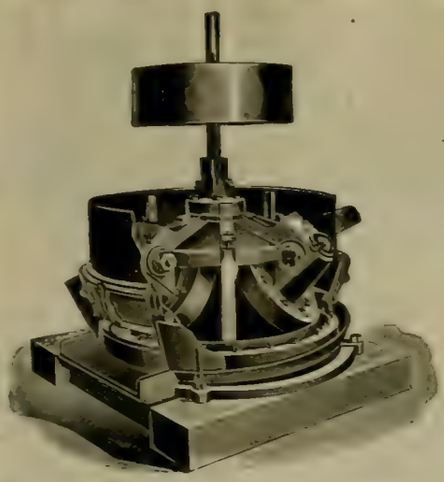

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ORE MILL.

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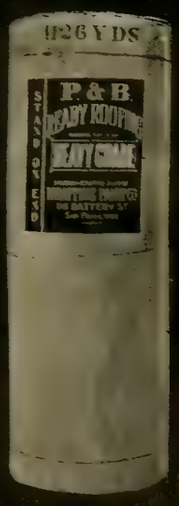

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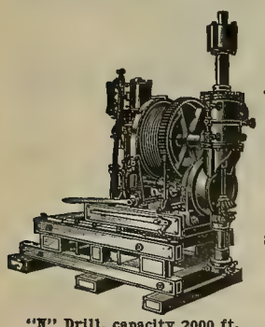

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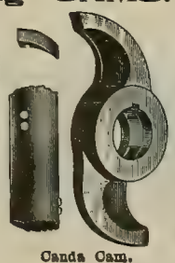

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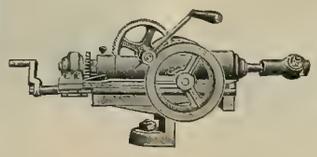

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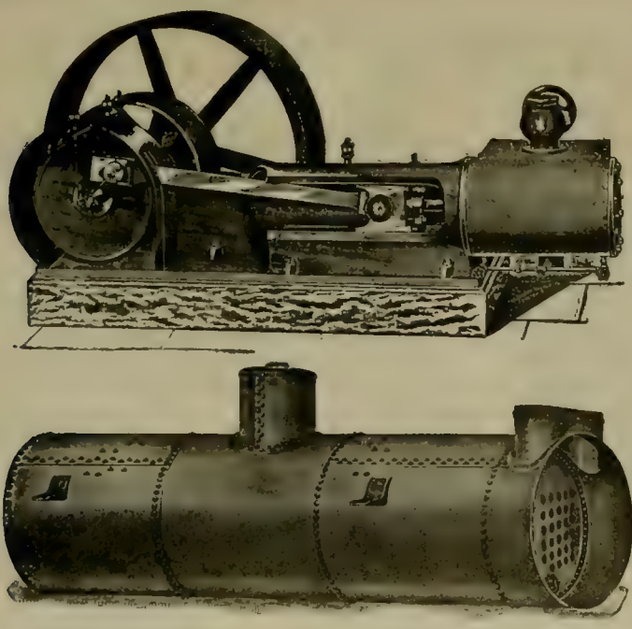

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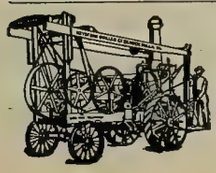

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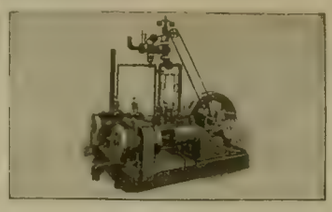

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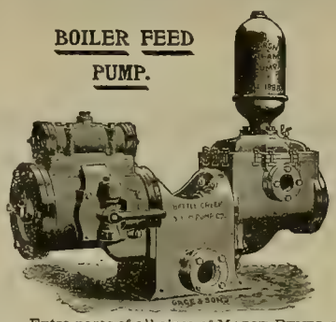

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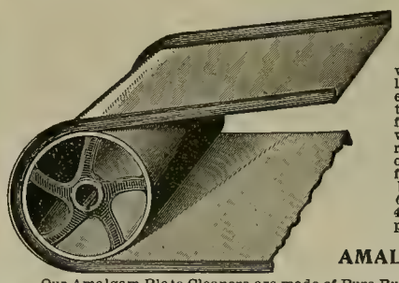

This illustration shows the edge flanging outwardly as it passes over the pulley. This relieves the strain from the top and bottom of the edge by directing the strain automatically to the inside face surface of the edges. Heretofore all belts have been so constructed that when they pass over the pulleys or rolls, a direct strain comes upon the top or at the base of of the edges, causing the edges to break away from the body of the belts in a very short time. *We avoid this Mechanical Defect by our Spadone Curved Edge.* Belts made to fit any machine—4, 5 and 6 feet wide. Prices and samples on application.

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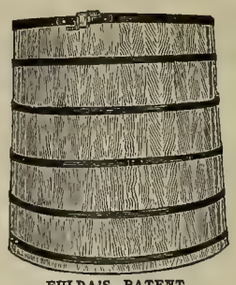

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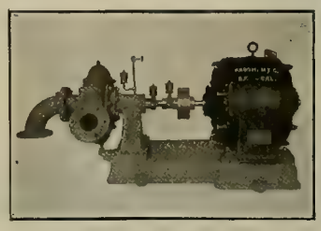

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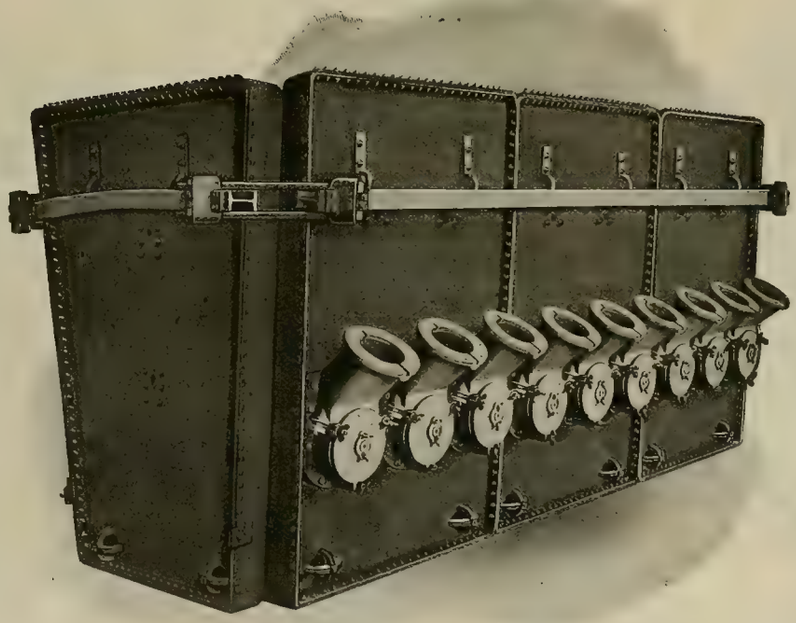

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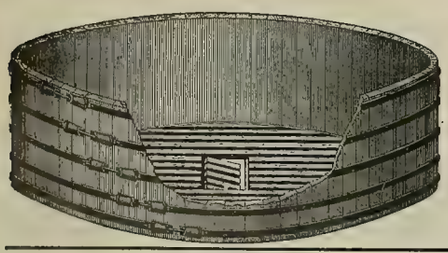

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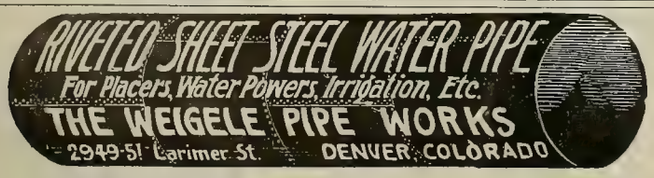

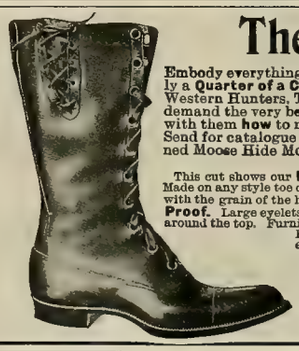

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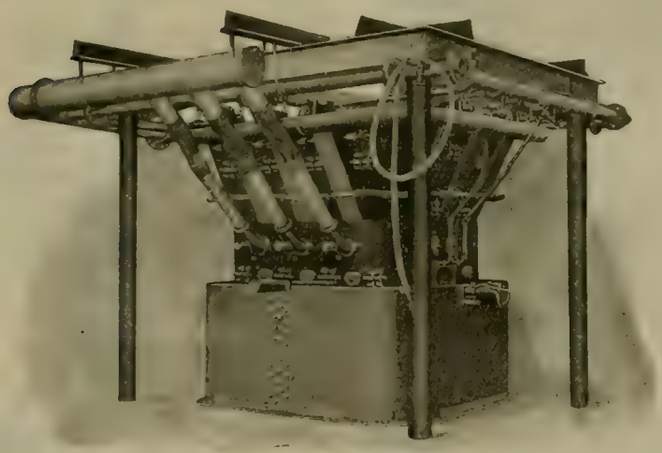

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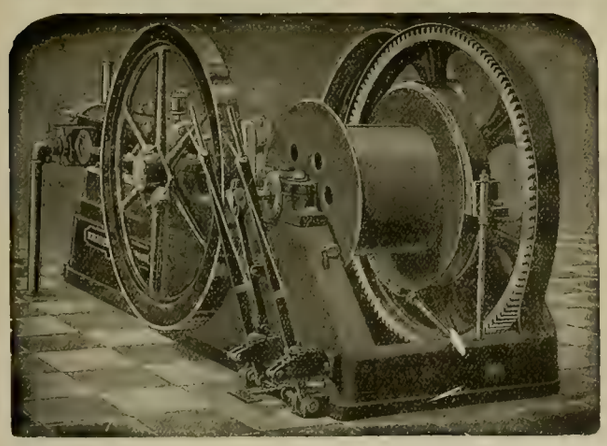

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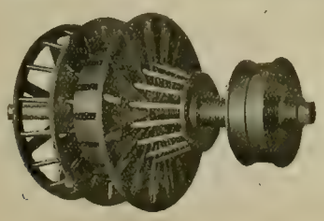

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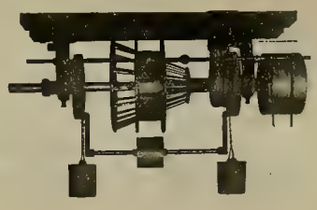

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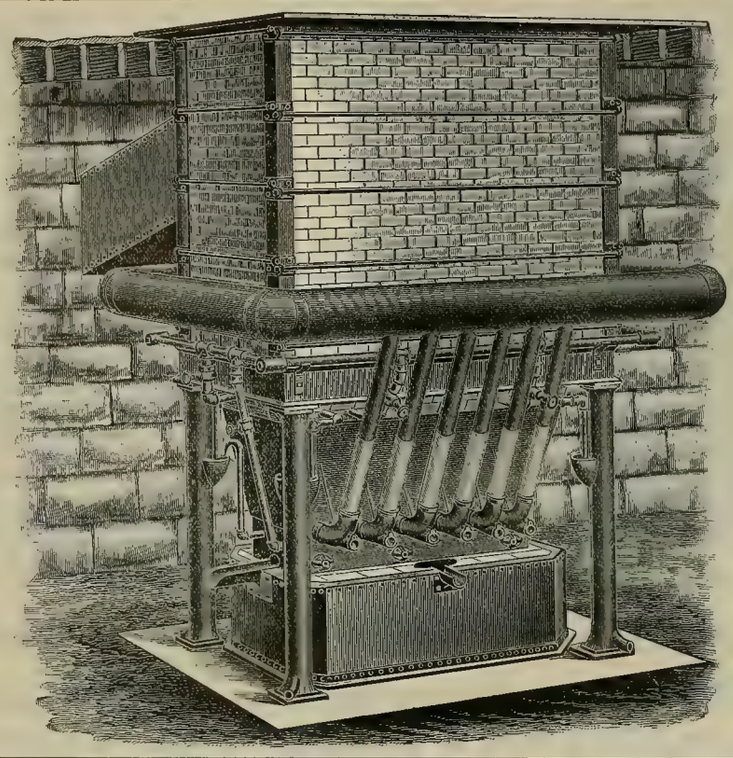

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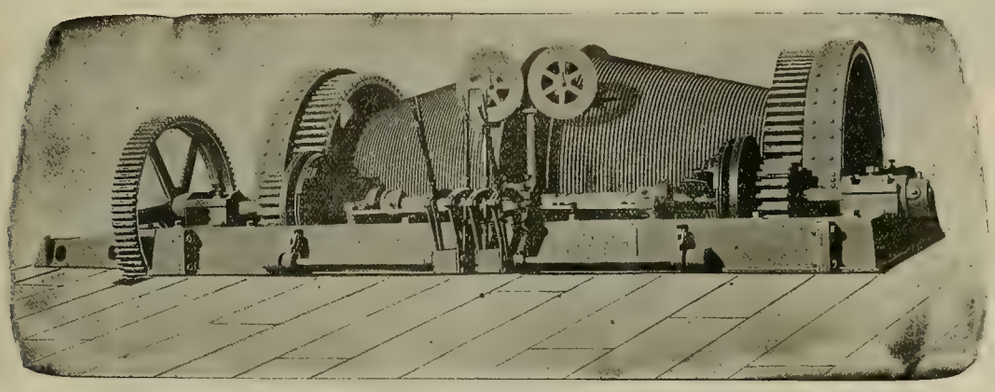

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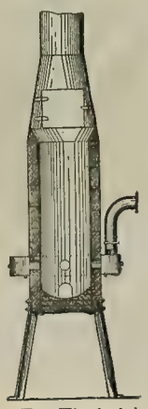

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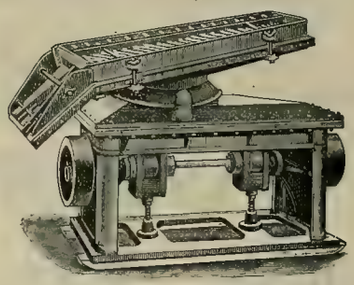

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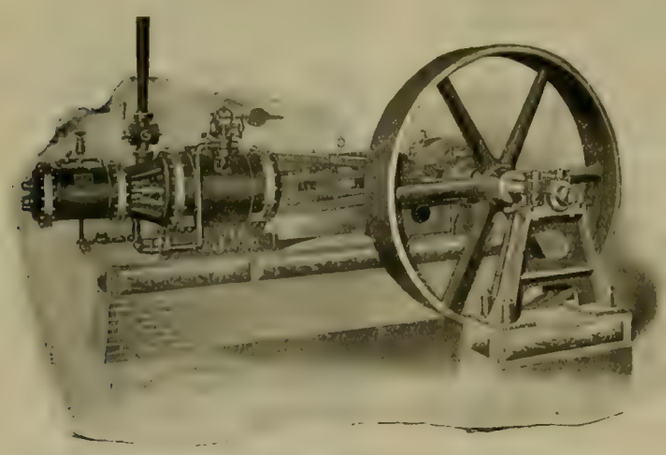

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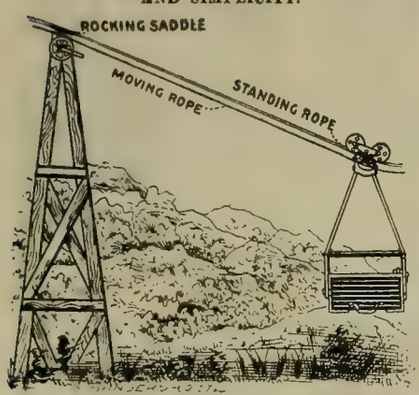

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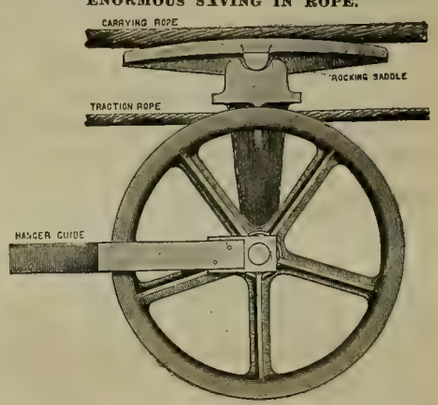

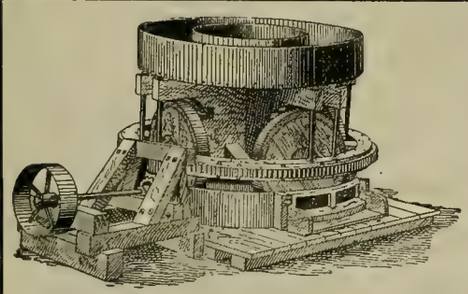

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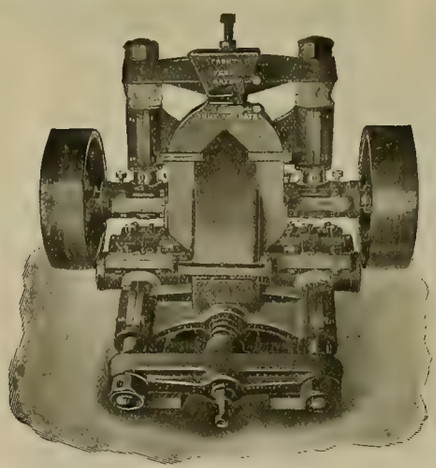

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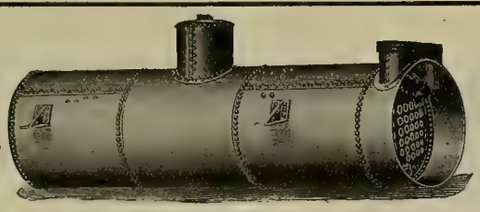

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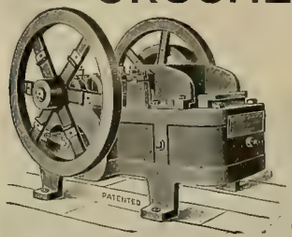

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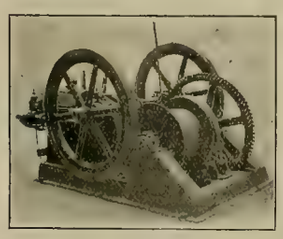

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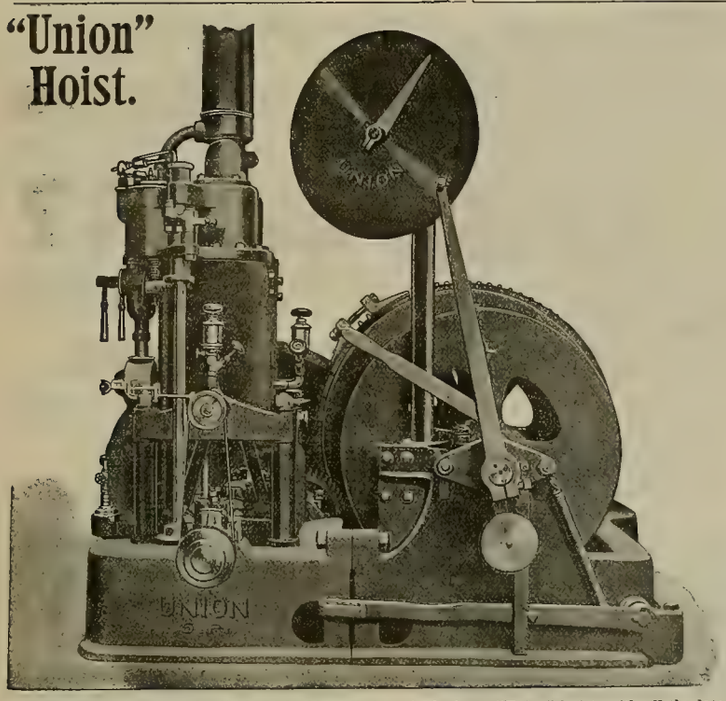

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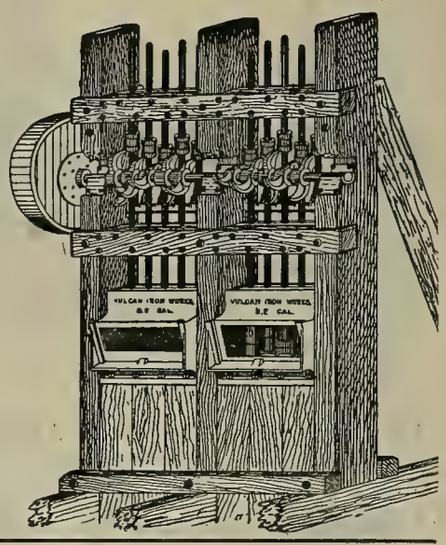

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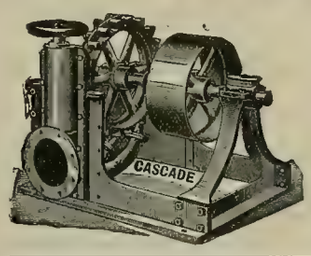

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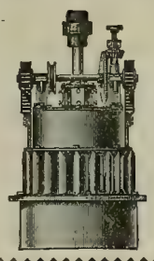

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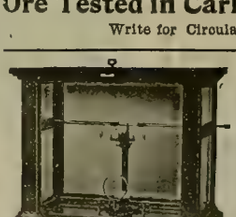

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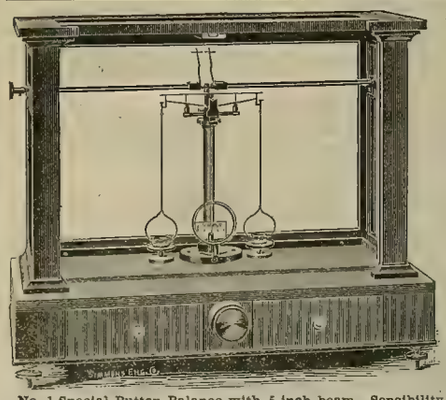

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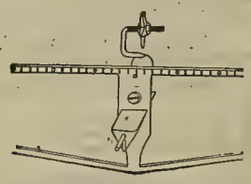

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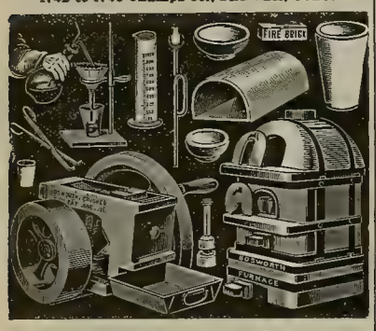

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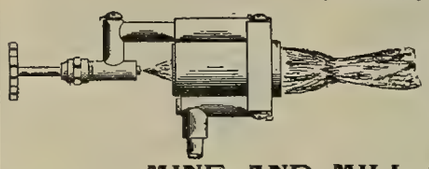

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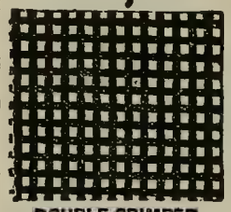

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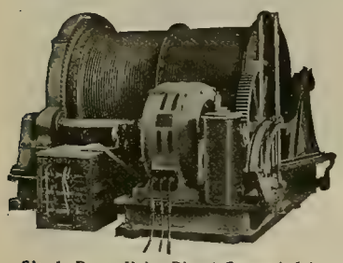

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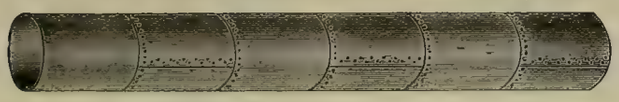

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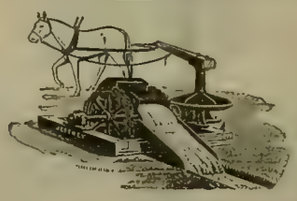

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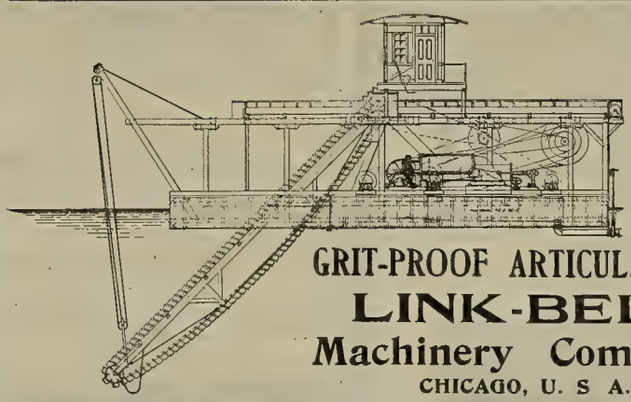

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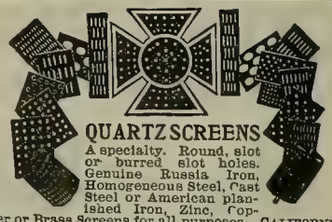

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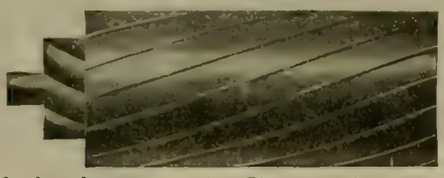

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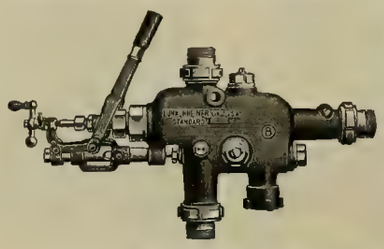

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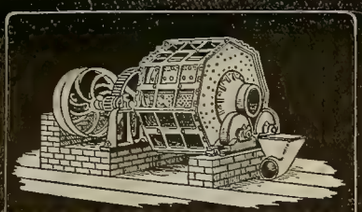

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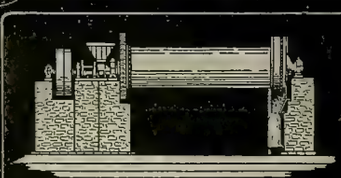

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225

ASSESSMENT NOTICES.

LARKIN MINING COMPANY.—Location of principal place of business, San Francisco, California; location of works, near Placerville, El Dorado County, California.

Notice is hereby given, that at a meeting of the Board of Directors, held on the 1 th day of March, 1901, an assessment (No 10) of two cents per share was levied upon the capital stock of the corporation, payable immediately in United States gold coin, to the secretary, at the office of the company, 112 Main street, San Francisco, California.

Any stock upon which this assessment shall remain unpaid on the 2th day of April, 1901, will be delinquent and advertised for sale at public auction; and unless payment is made before, will be sold on WEDNESDAY, the 15th day of May, 1901, to pay the delinquent assessment, together with the costs of advertising and expenses of sale.

By order of the Board of Directors.

N. F. REMINGTON, Secretary.

Office—112 Main street, San Francisco, California

SOUTH SLIGER GOLD MINING COMPANY.—Location of principal place of business, San Francisco, California; location of works Spanish Dry Diggings Mining District, El Dorado County, California.

Notice is hereby given, that at a meeting of the Board of Directors, held on the 25th day of March, 1901, an assessment (No. 1) of two cents per share was levied upon all the issued or subscribed for capital stock of the corporation, payable immediately in United States gold coin, to the secretary, at the office of the company, 402 Front street, Room 8, San Francisco, California.

Any stock upon which this assessment shall remain unpaid on the 6th day of May, 1901, will be delinquent, and advertised for sale at public auction; and unless payment is made before, will be sold on MONDAY, the 27th day of May, 1901, to pay the delinquent assessment, together with the costs of advertising and expenses of sale.

By order of the Board of Directors.

J. L. DANIELS, Secretary.

Office—402 Front street, Room 8, San Francisco, California.

AMERICAN OIL AND REFINERY COMPANY.—Location of principal place of business, San Francisco, California. Location of works, Contra Costa County, California.

Notice is hereby given, that at a meeting of the Board of Directors, held on the 26th day of March, 1901 an assessment (No. 3) of five (5) cents per share was levied upon the capital stock of the corporation, payable immediately in United States gold coin, to the secretary, at the office of the company, Room 823 Parrott building, 825 Market St., San Francisco, California.

Any stock upon which this assessment shall remain unpaid on the 29th day of April, 1901, will be delinquent, and advertised for sale at public auction; and unless payment is made before will be sold on MONDAY, the 27th day of May, 1901 to pay the delinquent assessment, together with the costs of advertising and expenses of sale.

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ALLIANCE EXPLORATION & MINING COMPANY.—Location of principal place of business, San Francisco, California; location of works, Ophir, Placer County, California.

Notice.—There are delinquent upon the following described stock, on account of assessment (No. 3) levied on the 12th day of February, 1901, the several amounts set opposite the names of the respective shareholders, as follows:

Names.	No. Cert.	No. Shares.	Amt.
T. Bielenberg	7	200	$4 00
T. Bielenberg	34	200	4 00
T. Bielenberg	44	400	8 00
T. Bielenberg	73	100	2 00
M. G. Mucovich	9	50	1 00
S. Zenovich	10	50	1 00
F. S. Johnson	17	200	4 00
I. Abrams	30	200	4 00
I. Abrams	31	200	4 00
I. Abrams	70	100	2 00
I. Abrams	126	2,000	40 00
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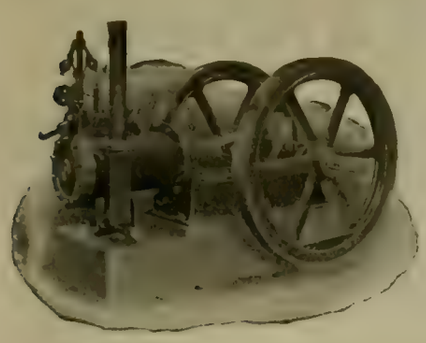

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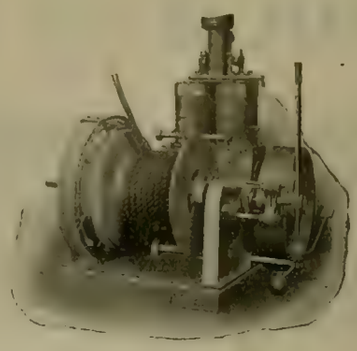

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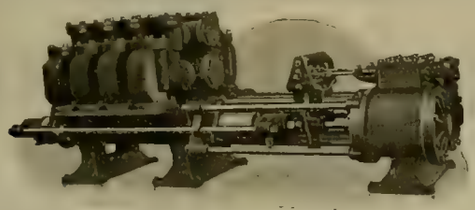

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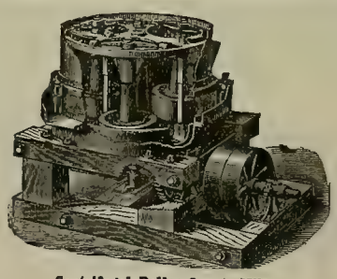

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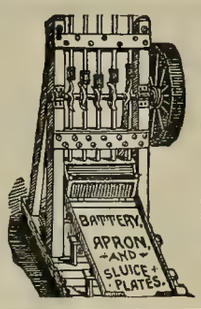

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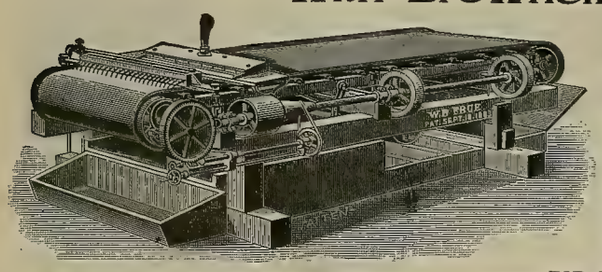

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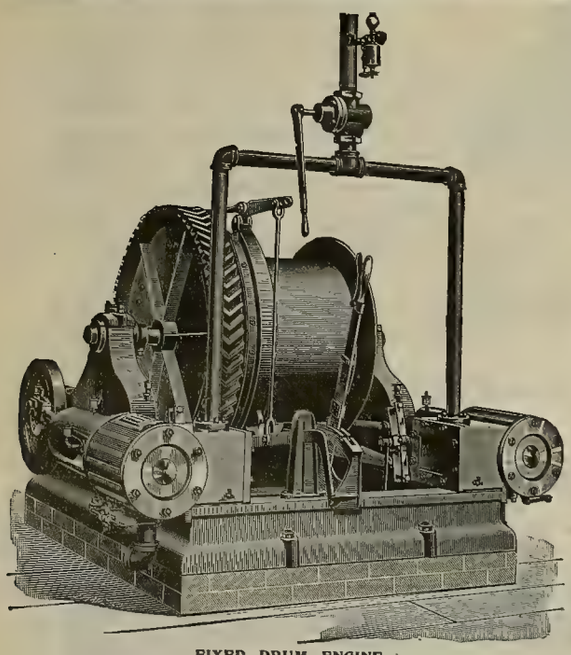

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MINING AND SCIENTIFIC PRESS.

Whole No. 2125.—VOLUME LXXXII. Number 15. SAN FRANCISCO, SATURDAY, APRIL 13, 1901. THREE DOLLARS PER ANNUM Single Copies, Ten Cents.

Old Channel Placers.

The placer discoveries made occasionally in hitherto unknown "old river channels" are reminders that possibilities of profitable drift and hydraulic mining still remain to be discovered and exploited in the California mountains. The recent strike in Tuolumne county, Cal., the finding of a channel in the Eureka Consolidated and another in the Big Dipper, in Placer county, Cal., and the discovery of the old Trinity county channel at Oregon Gulch, all within the past six months, are examples of the conditions referred to.

The exploration for these undiscovered channel deposits has become more certain and safe in its methods during recent years. The relation of the different channels to each other and the conditions that have determined the occurrence and distribution of gold in them are better understood now than even ten years ago. The practical application of this added knowledge permits some reconstruction of plans of old channel lines, connecting remnants and restoring original old lines, enabling synthetic reasoning to be applied to determine the most probable commercial possibilities of a particular channel considered.

The "old channels" are not all of the same geological age. There are several successive systems of them, occupying different lines within drainage basin limits which would seem to have suffered less relative change than the stream-cutting lines. Ross E. Browne very clearly stated the facts of the successive systems and suggested the special topographic changes which produced them in his contribution to the California State Mineralogist Report of 1890. Something additional to his admirable descriptive data is suggested here that may aid in solving in advance the practical commercial questions that the miner must answer.

The gold found in any of the channels had its first situs in a lode matrix of hard rock. The oldest of the "old channels" disintegrated and wore down the rock surface of its drainage basin and released gold from its original matrix. This gold, once free from its attached rock, accumulated in the channel bed of the cutting stream. Practically it ceased to move down stream when once free, but remained very close to the point where freed. Fine scale particles did move, just as their downstream movement is noted now, but the coarser gold remained in place, dropping down only as the rock was cut out from underneath it. Ultimately this stream cutting in depth ceased as it reached a level where, grade disappearing, the velocity diminished and would no longer cut or carry the rocks. Filling up with the products of erosion from above, the water flow raising on the accumulation ultimately regained a cutting and carrying gradient, which, working through the accumulations, restored the rock bed again, or, working on the side of the accumulations, cut more rock in place and widened the first cut bed, the process repeating itself till a comparatively small stream made a wide valley out of an initial canyon cut. Consideration of the grade conditions will deduce the conclusion that the gold deposited and accumulated in the first cut line would not move out of that line and become spread over the widened bed of the successive cuts, and the further conclusion that any gold found in the added width must come from the direct erosion of that line, and its relative mass to the mass in the first cut line would be as the ratio of the respective rock masses eroded. Again, consideration of the conditions of the two erosions will deduce the conclusion that the mass of the primary line of erosion is many times the mass of any one of the secondary lines, or all of them combined. Therefore the phenomenon of the "pay lead," a more or less relatively narrow line in a wide channel bed, carrying the mass of the gold, is the line of the first cut channel, and in its width fairly measures the width of the stream that originally flowed. It is notable that the line of this lead is relatively more direct than the boundary lines of the full bed. The Hidden Treasure mine, Placer county, Cal., in its white quartz channel is an excellent example of an original "old river," the pay lead being only a fraction of the full bed width. This, however, is not the point of these observations.

Consider, now, the second "old channel:" In its case, the old stream bed, instead of gradually building itself up first, was suddenly filled up by eruptive floods of volcanics to great depths, so that when a new line of drainage began to form it was at greater distances, horizontally and vertically, than such secondary cuts as are already described. It was the same kind of phenomenon, but in more extreme degree. There are conclusive reasons for believing the floods of volcanics were accomplished by regional tilting uplifts increasing the new stream grades. These eventually cut down channel beds to somewhere near the first cut planes, ordinarily going somewhat deeper. Considering, again, the physical conditions, it is fairly deductive that these new channel beds would accumulate gold, compared with the first channels, in the ratio of the masses of their respective bedrock cuts. Except under the exceptional conditions of a diversion into a line at a very considerable distance and of substantially equal depth of cut into lode-bearing bedrocks, the gold accumulated would certainly be less. As determining the relative time interval, it is observable that these second channels rarely show the "pay leads" that are characteristic of the first system of channels. The "pay lead" in these second channels, if there be a "pay lead" derived from gold concentration from primary erosion, is co-extensive with the full width of the channel cut, which here again is in a general way about the same width as the corresponding "pay lead" of the first channel. Where the second channel cuts in the line of or across the "pay lead" of a first channel, it receives its gold and adds it to its own direct accumulation, making a local enrichment that, misunderstood, has led many a miner to his financial destruction.

Third and fourth, and, in fact, all intermediate systems of channels till the existing stream drainage

L. E. Aubury, State Mineralogist of California.

California's State Mineralogist.

Herewith appears the portrait of L. E. Aubury, the new State Mineralogist of California, appointed by the Governor on the 5th inst., as stated in last week's issue. Mr. Aubury is the second vice-president of the California State Miners' Association, a Native Son of the Golden West. He proposes to administer the affairs of the State Mining Bureau in a business-like manner. He was born in Placer county, Cal., in 1862, and has had considerable practical experience in mining and metallurgical work in various parts of the Pacific coast. At the time of his appointment he was developing some gold quartz properties in Mariposa county, Cal., and acting as consulting engineer for three mining companies operating in California and Arizona.

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took form, were subject to similar limitations and conditions with the second system, the genesis of which is here described in detail. Generally they would cut successively less masses of the primary lode-bearing bedrock, and, generally, less successively of the preceding channels. They are thus less notable as gold producers to mining; indeed, it is safely to be concluded that, if an old channel is not gold-bearing, it is neither of the first or second system.

The existing stream lines have cut so far through the old beds that the masses of the lode-bearing rocks cut bear a more appreciable ratio to the corresponding masses cut by the first channel system. Still, it is inferable that they are less. The beds are not yet down to a corresponding base plane of erosion. Like the first system, however, and unlike the intermediate systems—except in some uncommon instances—the existing stream channels had a fairly uniform distribution of gold lineally. The exceptionally large accumulations in certain sections were places where the first and second systems had been cut out.

In a general way, certain observable facts with the preceding suggestions are possible of reasoning to and from. The first channel system is characterized by "pay leads" occupying a fraction of total channel bed width and a fair lineal uniformity of gold accumulation. The last (existing) system has no special development of pay leads and less uniformity of lineal accumulation of gold; the intermediate systems lack characteristic pay leads, and are uncertain as to gold accumulation lineally; the miners would say the pay is spotted.

There are still many unexplored fragmentary remnants of the first and second systems of channels that have prospective commercial value. The suggestions made may be of some assistance in establishing identity and probable extent of minable gold content.

THE idea of the U. S. Government to establish a mint at Manila, P. I., U. S. A., is of importance to Western miners. Such action would create a clearing house for American silver in the Orient and would stimulate the demand among the 600,000,000 people who demand and hoard silver. It would be of benefit to miners wherever silver is susceptible of production, would transfer the control of the silver [illegible]et to San Francisco and would lead to further [illegible] and industrial developments that naturally go [illegible] progress and expansion.

Silver in the Orient.

The commercial position of the United States in the Orient incident to the possession of the Philippines, should ensure to the country, and particularly to the Pacific mining section of it, the control of the world's greatest silver consuming market—the Chinese Empire. A step in the right direction toward this control is the establishment of a Manila branch of the United States Mint. A second step, and one certain to be made before long, will be the establishment of United States banking facilities in Manila and Shanghai and more or less in other Chinese cities. After these two steps, the rest will follow naturally. From the existence of causes or influences that would seem to have no reasonable business excuse for existence, steamship freight charges are less on silver shipped from, say, Germany, via the Suez Canal and around the south of Asia to Shanghai, a voyage of over thirty-five days, than they are from San Francisco across the Pacific to the same place, a voyage of not more than twenty days. The marine insurance of the silver from Europe to Shanghai, the longer time and proportionately greater risk, is more than from San Francisco to Shanghai, the shorter time and relatively less risk. The interest loss for the elapsed time between shipment and delivery, which must be borne by the seller, would certainly be against the most distant supply point. Exchange, always a factor in international business, should now be favorable to the Pacific coast, or, at least, not so greatly to its disadvantage as formerly.

With the branch mint and our banking facilities at Manila, it would seem that a depot for our silver product could be established there, supplied directly from the silver-producing Pacific coast States. It is assumed that the advantage of freight and insurance charges could be secured to the shipment of silver across the Pacific, to which it logically belongs.

Silver is the banking money metal of the Chinese. They understand, at least the commercial classes do, the changes of relative value measured in gold, still they use it to hoard their surplus wealth accumulation and will doubtless continue to for many years to come. They understand and are able to determine accurately the fineness of silver. In transactions among themselves they discount any debasement of fineness of the pure metal, so that only fine silver, 999 fine, should be marketed to them. The large bars made by our refineries they cannot use in transactions among themselves. They remelt these and cast the silver into rough cup-shaped forms weighing from one to three pounds, and these pass from hand to hand by weight. So far as known there is no prejudice among them as to the shape, so that our refineries could cast from the first melting of the refined silver "bars" and "kings" of the small weights noted. These saving the cost and loss of remelting by the Chinese would have some market value in excess of such large commercial bars as are now made.

At the present time a very considerable proportion of the silver taken by the Chinese passes through Hamburg, Germany. Manila is so much nearer a supply base for the metal that it should supply the market. The Chinese are close buyers. In their own exchanges the price of silver changes from day to day, and the demand between the seasons, and they speculate in it just as our own people do in wheat and corn. They could hardly fail to avail themselves of the advantage of a silver supply fewer days distant than the alternative supply is weeks distant.

COMPLAINT is made by a producer of a piece of mining machinery that he is unappreciated; that while he has a manifestly good article, something of value to miners, yet he is passed over and there is no demand for his production. There is always something pathetic about so old and so common a story. Probably the business office of every mining journal in the country is visited weekly by some one who has invented or is making some kind of mining appliance that he thinks needs only to be seen to be prized, and who wonders why the buying public does not eagerly reach for it. The men of whom complainant is a type either do not know or have forgotten that inventing or manufacturing an article and creating a demand for it are two entirely separate and distinct things. Many men manage both successfully; many more do not—they can not, and their chief need is a business manager. There is many a clever device, many a saleable article, many a really meritorious production, that would make a financial success were its merits made known and a demand properly created for it, but in these bustling days of competition few things can be sold before a demand is created for them, and unless possible and probable users are informed of the merits of a device or appliance it will remain unsold.

The Smelting Combination.

The American Smelting & Refining Co. have increased their capital stock to $100,000,000 and have bought or amalgamated with the Guggenheims. The suit brought to restrain the purchase was withdrawn, the objections of stockholders having been adjusted.

It is early to determine the commercial effect on mining of the practically total elimination of the custom smelting competition. There are possible some economies that will reduce smelting costs, and treatment charges may be diminished, lowering the commercial limit of ore value that can be mined and increasing the quantity of the output. But with these possible advantages that the smelting monopoly may share with the mining will come a restriction of the independence of the miner, and the forced assumption by him of all the risks incident to mining. With competition between smelters, the miner could share with them the risk of the market for his product of the metals other than gold, which is always worth $20.67 an ounce. The consolidation, however, will hardly assume any of this clearly avoidable risk simply because it will not have to. On the other hand, there is a certainty of dealings with the single buyer that will be distinctly to the advantage of the larger and cheaper producers of ores. The business for them will take on a more commercial character. A secondary result can not fail to be a consolidation of the mines supplying the ores. On the mine owners the combination is the beginning of a pressure that will cumulate and in the end be irresistible. It is the logical end, that would seem to be anticipated by what is now occurring.

THE hearing by the California Railroad Commission of the appeal of the oil producers to have lower freight rates has been postponed till some time in May to permit the elaboration of the question by the attorneys, which means, if the lesson of similar contests in California has any pertinence, that there is practically an indefinite postponement of the possibility of reduction through the means provided by law. Why this should be so is not clear; the question deals with practical every-day business and seems remote from the abstractions of the law. Oil wells do not live forever, and people who sink them must market their product. Postponement has the effect of making the financial sufferers of to-day work for producers of to-morrow without benefit to themselves. After all, the railroads help those who first show ability to help themselves. Suppose that some of the money that is going steadily into vertical holes in the ground be put into a horizontal hole on the surface—into a pipe line to the open sea. There are no physical obstacles that are insuperable, and the combined capital now in the industry should be equal to the financing of it.

IT is never safe to condemn a mining prospect without fair exploring and exploitation. And nothing but intelligent development work will determine whether or not the prospect can be made into a mine. The history of every mining region proves this. Take the Territory of Arizona. The great Congress mine, the deepest in Arizona, was accounted a "wildcat" at the depth of 150 feet; at the depth of 800 feet it was a bonanza and held at $3,000,000. The Fortuna was worth $100,000 at a depth of 150 feet, and worth $2,000,000 at a depth of 600 feet. At a depth of 100 feet the King of Arizona sold for $30,000; when 500 feet deep it was worth $1,000,000. The Crowned King mine was not considered worth being got out of debt when the workings were 165 feet deep; at a depth of 400 feet its value was $1,000,000. The Pearce mine was sold for $275,000 when down 100 feet; since then $2,000,000 was refused for it. These are but a few in Arizona. Every other great producing section can tell a similar story.

Concentrates.

A "STUDDLE" is a corner post in shaft timbering.

UNOXIDIZED tellurium ores require a dead roast before cyaniding.

COPPER furnishes the best and biggest present metal mining dividends in this country.

THE limit of efficiency in a stamp, so far as weight goes, is believed to be below 1000 pounds.

A MINERS' INCH in California is now legally determined to be a flow of 1½ cubic feet per minute.

A MIXTURE of lead 75 parts, antimony 16.7, bismuth 8.3, will give an alloy that expands when cooling.

THE value of an expert's opinion is sometimes to be measured by the instructions given him to report.

THE evaporation of gasoline at high altitudes over 5000 feet is such that it is desirable to use a heavier oil in explosion engines.

THE character of the ore must determine whether wet or dry crushing shall be employed. In case of direct cyaniding, modern practice tends to dry crushing.

THE power of a rock drill is in direct proportion to the area and weight of its piston. Its efficiency depends, largely, upon its adaptability to the work that it is expected to do.

THESE little paragraphs every week are largely answers to a variety of questions, made as brief as accuracy will admit, the questions themselves omitted for want of space.

A "FAULT," as the word is used in geology, is applied to describe a line of fracture or break of the rock formation where one side of the break slips and becomes displaced, relative to the other.

Probably the best work on mine timbering of recent years is the treatise by W. A. Storms, and published some years ago as a bulletin by the California State Mining Bureau. It is now out of print.

THE spodumene shipped in carload lots from the Woods mine, near Keystone, South Dakota, is a silicate of alumina and lithia, and, when pure, carries about 10% aluminum and 2% of the metal lithium.

WHEN air is used to drive machinery of any kind, the mechanism so employed is called a compressor; when the air is used for smelters, furnaces, ventilators, etc., the compressor is called a blowing engine.

SODA ASH for boiler incrustation may be pumped in with the feed water, in the proportion of about one-fourth pound per horse power of the engine, and the boiler blown out and cleaned out next day.

IT is reported that the Carnegie Steel Works have bought and experimented with a patent for coating steel with aluminum, much as iron is coated with zinc. There is nothing of the kind on the market yet, however.

A "STULL" is a stick of timber reaching usually from wall to wall, for supporting the hanging wall, or placed nearly horizontal to help form floors of lagging on which ore or waste may be broken down from overhead.

CYANIDE, when bought in large lots, is obtained at much closer figures than those on small consignments. The Con. Mercur G. M. Co., Mercur, Utah, buys 400,000 pounds at one time, and hence, gets the benefit of wholesale rates.

SHIPMENTS of lead ore in the shape of sulphate are rarely received at the Selby Smelting & Lead Co.'s Works, Selby, Cal. They usually get lead ores in the shape of either sulphide (galena) or carbonate, mostly the former.

IT is doubtful if there is any process of reducing ore to a fine state of division cheaper than wet crushing with stamps; or any method of recovery cheaper than plate amalgamation, where the ore is readily susceptible to such treatment.

THE Supreme Court of California has decided that labor performed in breaking down and tearing away from the face of a drift quartz and other substances in a mine creates a rightful lien for labor in the "construction, alteration and repair of a mine."

AN Arizona law has made the cubic foot of water the legal measure in that territory. Where miner's inches have been used, 100 inches are to be counted as the equivalent of 2½ cubic feet a second. This is identical with the measures provided by recent laws in California and Montana.

TO AVOID the claim jumper, it is well to conform to the strict legal requirements of staking and marking boundaries. Before everybody was locating claims trouble from this source was infrequent, but the newcomers look closely for technical defects and take advantage of them.

THREE 2½-inch rock drills, at sixty pounds ocean level, would need a compressor with free-air capacity of 133 cubic feet; at eighty pounds, ocean level, 168 cubic feet per minute. At 5000 feet altitude, seventy pounds pressure, a drill would require free-air capacity of 177 cubic feet per minute.

MORTARS for stamp mills are frequently provided with steel linings for ends and sides and steel false bottom for dies to rest on, thus reducing wear on inside of mortar castings. In double discharge mortars the pulp discharged through the back screen flows toward the center at the back of the mortar, thence conveyed through openings in base of mortar, joining the pulp from the front screen. In dry crushing all mortars are double discharge.

TUNGSTEN minerals find their principal utility in the preparation of ferro-tungsten, which is used in making tungsten steel. The steel manufacturers are the buyers of the ores; but market prices are variable, the use being new. The Illinois Steel Co. or the Bethlehem Steel Co. will quote prices on application.

THE failure to record a work notice within the period provided by law does not work a forfeiture of the claim. The record is prima facie evidence of the fact that the work was done, but if not recorded and the work was actually done the claimant may produce proof in a trial court that he did in fact perform the work and prevent a forfeiture.

THE barometric reading in inches multiplied by .4908 = pressure per square inch, from which is determined the approximate altitude. For instance, if the barometer indicates 25.4, the pressure per square inch is 12.47, showing, approximately, an altitude of 4620 feet. The barometer standing 21 inches indicates: pressure, 10.31; altitude, 9900 feet.

A JUDGMENT against a corporation which, by the laws of the State in which it is rendered, is binding on the stockholders must be given by a court of another State the same conclusive effect against a stockholder who is sued therein, and the only defense which he can make against it is that which he can make in the courts of the State in which it is rendered.

THE Montana Supreme Court has decided that miners claiming extralateral rights must bear the burden of proof. The decision holds that the owner of a claim has a prima facie right to the whole of it; that a person entering from an adjoining claim is a prima facie trespasser, and, if he claims rights because following the vein from an adjoining claim, the burden of proof is on him to justify his trespass.

THE price of gold is not going down, though a Harvard professor is quoted as predicting an enormous increase in the production from dredging operation of placers. The mechanical handling of gold-bearing sands by dredging costs a sum fairly close to the value of the gold obtained. There is no such general distribution of gold values in the sands and gravels available for dredger exploitation as the professor is reported as claiming.

IN Montana corporations issuing capital stock must annually file a report between Aug. 10th and Sept. 21st, stating amount of capital stock proportion paid in and amount of existing indebtedness. Such report must be signed by the president and a majority of the trustees, and published in a newspaper nearest the principal Montana office of the corporation. Failure to comply with the foregoing renders the directors liable for all the debts of the corporation.

THE diamond-bearing formation at Kimberly is a serpentine—the filling of an old volcanic crater. Serpentines are abundant in Sierra Nevada mountains, Cal., and it is possible that the diamonds found in placer mining in Butte and El Dorado counties may have come from some of these serpentines. While mining for placer gold no one was specially looking for diamonds, the finds being incidental. Possibly, if prospecting was done systematically, the source of the supply might be found.

FULLER'S EARTH, such as is found near Bakersfield, Cal., can be used for refining mineral oils. The ordinary way is to dry the earth thoroughly, then grind to 60-mesh and fill it into long cylinders through which the crude black oil is allowed to percolate very slowly. The oil that first comes out is clear as water and much thinner than that which follows. When the color of the exuding oil reaches a certain maximum shade the process is stopped, and the cylinder refilled with fresh earth, when the percolation is resumed.

THERE are cinnabar deposits in New South Wales and some other Australasian colonies, but their development has been slight and so far has not proved profitable. Quicksilver is mined in a small way at Savonas, B. C., and at Terlingua, Texas. The quicksilver industry in California is on the increase, there being new deposits recently found in various parts of the State. The present annual production of the world is about 4400 tons, of which about 1800 tons are produced in Spain, 1300 in California, 800 in Austria, 500 in Russia.

THE action of vapors in volcanic districts in forming ore deposits can not probably be separated from that of hot solutions. In most cases both are in operation at the same time. On the borders of molten rock bodies such fumarole action is active in metamorphosing the cold country rock. Often, without completely destroying the identity of the country, ore materials are deposited in the interstices and cracks. In this way considerable ore accumulations are often made along the contact of the molten body of rock and the country.

FOR the manufacture of artificial ice there are two general methods, the can and the plate systems. In making ice by the can system, galvanized iron cans containing the water to be frozen are immersed in a brine bath maintained at a low temperature by submerged cold ammonia expansion coils. The water is frozen inwardly, and any air or impurities existing in the water are, of necessity, frozen into the center or core of the ice block. To so make clear ice, it is essential to use water that has been carefully filtered and purified. In the plate ice-making process the plant submerges the cooling or freezing coils directly in the fresh water to be frozen and allows the ice to form on the outside of these coils, from which it is then cut. The water is frozen outwardly, excluding the air and impurities into the residual unfrozen water.

GOLD-SODIUM CHLORIDE is used mostly in photography. The best is supposed to contain 30% metallic gold, but is often adulterated. It sells at from $7 to $15 per ounce. The amount of gold therein can be determined as follows: Transfer the contents of the vial into a 250 c. c. evaporating dish by means of 100 c. c. of a 1% solution of pure sulphuric acid. In this mixture dissolve two grains pure oxalic acid, then place the whole on a steam bath for two hours, or until all the gold is reduced to the metallic state. Decant the clear liquid as closely as possible, wash the gold with distilled water, dry, ignite and weigh.

LEAD mined in Canada may be shipped to the United States, undergo any process of manufacture and, afterwards, by way of Great Britain, be returned into Canada at a reduced rate of duty. The bulk of the Canadian and Mexican lead smelted in the United States is thus reshipped to Great Britain. Such lead passes through the United States in bond, encounters no duty in Great Britain and commands there a price which is usually less than 1½ cents per pound lower than the New York price. Under the privilege of free re-entry the smelters at Trail and Nelson, B. C., return a portion of their lead output into Canada, after having it desilverized in the United States.

PLATINUM in Russia is found under conditions that connect it with serpentine as the original rock matrix. In California it is not so localized. Serpentine belts are prominent in the Sierras, but platinum is rarely found there, and prospecting for it is not justified. The heavy mineral that was hard to pan away that the old miners tell about was undoubtedly something else. In the Siskiyou and Trinity mountains the serpentine would seem to have been more or less productive of platinum, and while perhaps not worth the risk of special prospecting for, the heavy minerals remaining with the placer gold in the last panning will generally pay for saving for the platinum they contain.

THERE is a difference between "conditions" and "indications" in determining the question of boring for petroleum in any particular tract of land. The "conditions" relate to the nature of the rocks, their stratigraphy, dip, the position of folds and such structural phenomena. The "indications" are what the surface shows, such as escaping gases, salt and mud springs, whitened shales, bitumens, seeping oil or asphaltum. Both conditions and indications should be studied carefully. Neither is conclusive in determining the commercial probabilities, which are what is wanted before one bores for oil. It frequently happens that the "indications" are all right and the "conditions" all wrong, or it may be the reverse. In neither case is commercial success probable.

IT may be considered as demonstrated that the earth would be fluid at a certain depth but for the pressure of the superincumbent mass which prevents it expanding to the volume which fluid requires and presses it into a solid. The relief of pressure allows that to expand and become liquid, and it is already above the temperature of fusion, but is unable to fuse because of pressure. When that pressure is removed it expands into fusion. The interior of the earth is mostly a solid. Up to within 30 or 40 miles of the earth is solid. The center of the earth is solid with small reservoirs, a certain amount of liquid matter in local pools, of vast extent in some cases, deriving the heat from the initial heat of the earth, the residual heat from the original heated condition of the earth. This may constitute the explanation of a volcano.

IN the MacArthur-Forrest cyanide method cyanide solution is used without any other chemically active agent as a lixiviant, and filiform zinc as a precipitant. In the Siemens-Halske process the cyanide solution is used as a lixiviant, the gold and silver being electrically precipitated on lead cathodes. The Pelatan-Clerici process provides for fine wet crushing of the ore, with little water, making a thick pulp, subsequently agitated in vats with the addition of solid cyanide, so proportioned as to result eventually in a weak solution. After sufficient agitation an electric current is turned on, a mercury bath at the bottom of the vat acting as a cathode, and iron plates in different parts of the vat serving as anodes, with a view to having the coarse gold not dissolved, as well as the gold in solution, received in the form of amalgam.

REVERBERATORY SMELTING of lead ore consists of a combined roasting and reaction process, in which the two operations are repeated one after the other. In hearth smelting, on the contrary, these two operations, which also constitute the process, are not consecutive, but simultaneous, roasting and reduction going on at the same time. In the reverberatory furnace lead is reduced from the ore by the interaction of the unaltered galena—that is, the sulphide—with the sulphate and oxide; in the hearth furnace there is additional reduction from the lead oxide by carbon. The reverberatory furnace is worked without a blast, the hearth with one. In the latter furnace the ore and fuel do not rest on a solid bed, but on a bath of molten lead. The charge in the hearth furnace is never fused; but at intervals the blast is stopped, a portion of the charge removed, the poor slag separated from it, and, after cooling and an admixture of lime to stiffen it, the charge portion is returned to the furnace.

Power Required by Stamps.

To THE EDITOR:—I have only just received a copy of your issue of February 23rd, containing Mr. A. W. Warwick's excellent paper on the power required by stamp mills. Mr. Warwick discusses in his paper certain formulas that I had published some years ago in my "Handbook of Gold Milling," and although a considerable interval must necessarily elapse between the date of publication of his paper and the arrival of the present comments thereon, I hope that it will not be too long to prevent your inserting this letter.

Mr. Warwick bases his comments upon the statement that the indicated power required to drive a certain mill was 1.785 H. P. per stamp, while according to my formula it should only have been 1.393 H. P. Now, in the first place, my formula is only intended to determine the power absorbed by a well-designed stamp mill. If the mill in question were badly designed or badly constructed, it might use far more power than the figure stated by Mr. Warwick, without, therefore, impugning the correctness of my formula. Thus in one case I found that a light (700-pound) mill was consuming over 2¼ H. P. per head, of which only about 1¼ H. P. did useful work, the remainder simply straining and racking the mill structure. I should like, however, to assume that Mr. Warwick's mill is a fairly well designed one, and is not consuming much over the theoretical amount of power as determined by my formula. Even in this case the discrepancy in the figures noted by Mr. Warwick admits of a very simple explanation, the very simplicity of which has probably caused that gentleman to overlook it. My formula determines the amount of effective power that has to be applied in the form of torque to the cam shaft. Mr. Warwick has indicated his mill engine, and, therefore, has simply determined the amount of work done by the steam upon the piston of his engine. In other words, he has taken indicated horse power as though it were brake horse power, and has, moreover, forgotten to allow for the power absorbed by the belting that transmits the power from the engine to the cam shaft. Without knowing the class of engine employed by Mr. Warwick, it is impossible to say how much greater the indicated horse power would be than the effective, the latter ranging from less than 60% to over 90% of the former. If his engine is an ordinary high pressure horizontal engine, such as is used for driving ordinary mills of small size (say under twenty stamps), the efficiency will probably not exceed 80% or 85%, so that an indicated horse power of 1.785 would be equal to an effective horse power of only about 1.4 to 1.5, and when further the power absorbed by the belting is taken into account it will be obvious that Mr. Warwick's figures appear to confirm very fairly the correctness of my formula.

To account for the supposed discrepancy between his observations and my formula, Mr. Warwick calculates what he calls an "inertia factor;" that is to say that he calculates in the first place the height to which the stamp would rise owing to its upward velocity when the tappet leaves the cam, and considering (as is actually the case) that the work of generating this velocity has to be performed by the cam, he expresses this additional work in the form of a hypothetical addition to the weight of the stamp. He is quite right in considering that the work thus done in lifting the tappet above the point where the toe of the cam leaves it has to enter into the calculation. He prefers to state this in the form of an increase in weight, whereas I prefer to state it in the form of an increase in the height of lift, which it really is. I quite admit, however, that his method would give equally correct results if correctly applied. Here, however, Mr. Warwick has gone wrong, because he has calculated the height to which the stamp would be lifted if there were no friction, and has then proceeded to calculate the friction absorbed during the whole of his hypothetical lift, taking the proper frictional coefficient. He, therefore, greatly overestimates the correction to be applied.

On the other hand, careful examination of my formula will show that I have not neglected the question of the work done by the cam in lifting the tappet above the toe of the cam, seeing that I have taken for the height of lift in my formula the height to which a true involute would lift the tappet, although the toe of the cam is a modified involute, giving a lift of ¼″ to ⅜″ less than the true involute curve (page 204, "Handbook of Gold Milling," second edition). In other words, I add about ¼″ to ⅜″ to the theoretical height of lift as taken from the cam drawings, and I find that, allowing for the depth of the bed of quartz on the die, this gives a figure very closely approximating to the actual facts.

Mr. Warwick considers that the formula for the friction in the guides as given by me is too small, and that it ought to be doubled because there are two guides. It is, however, perfectly well known that friction is independent of the area of the rubbing surfaces in contact, and depends only on the amount of motion. The amount of power lost by friction is, therefore, quite independent of the number or depth of the guides, and, other things being equal, depends only upon the actual lift of the stamp.

I have made numerous tests and have indicated mills driven by various types of motors—steam, hydraulic and electric. In each case the same difficulty occurs. It is easy to determine how much force is applied to the motor, but very difficult to determine how much is given out. The best plan, practically, though not quite exact, is to run the mill at a given speed and to then indicate the motor, throw off the belt, and run the motor alone at the same speed as it was running at in the first test, and again indicate it. The difference is the power used in driving the mill plus that lost in the transmission. If the transmission is by belting, the loss can be calculated with sufficient accuracy. If Mr. Warwick will do this for the case in question, I expect he will find that the power thus absorbed by his engine running unloaded will be somewhere about 0.3 H. P. per stamp.

Furthermore, in calculations of this kind I always determine the lift of the stamp by actual experiment. I slip a sheet of paper round the stamp stem above the top guide, and keep it in place by means of a couple of india rubber bands, and then hold a pencil firmly against the top guide so that its point touches the paper on the stamp stem. On taking off the paper the height of lift (and incidentally, also, the amount of rotation of the stamp) can be directly measured on the paper. With a little practice it is easy to do this while the mill is running.

I hope that these notes may prove of interest to some of your readers, and that I have made clear how the power really absorbed by a stamp mill can be measured. The essential point is to bear in mind that no formula can do more than determine the effective power absorbed, and that this power is always less—and sometimes a great deal less—than the indicated power of the motor. HENRY LOUIS.

Newcastle-upon-Tyne, England, March 16, 1901.

Genesis of the Diamond.

The dry diggings of the Kimberley district, in South Africa, afford the unique locality in which the diamond has thus far been found in its original home, and all our knowledge of the genesis of the mineral has been derived from study of this locality. The mines are located in "pans," in which is found the "blue ground" now recognized as the disintegrated matrix of the diamond. These "pans" are known to be the "pipes" or "necks" of former volcanoes, now deeply dissected by the forces of the atmosphere—in fact, worn down, if not to their roots, at least to their stumps. These remnants of the "pipes" through which the lava reached the surface are surrounded in part by a black shale containing a large percentage of carbon, and this is believed to be the material out of which the diamonds have been formed. What appear to be modified fragments of the black shale enclosed within the "pipes" afford evidence that portions of the shale have been broken from the parent beds by the force of the ascending current of lava—a common enough accompaniment to volcanic action—and have been profoundly altered by the high temperature and the extreme hydrostatic pressure under which the mass must have been held. The most important feature of this alteration has been the recrystallization of the carbon of the shale into diamond.

This apparent explanation of the genesis of the diamond finds strong support in the experiments of Moissan, who obtained artificial diamonds by dissolving carbon in molten iron and immersing the mass in cold water until firm surface crust has formed. The "chilled" mass was then removed, to allow its still molten core to solidify slowly. This it does with the development of enormous pressures, because the natural expansion of the iron on passing into the solid condition is resisted by the strong shell of "chilled" metal. The isolation of the diamond was then accomplished by dissolving the iron in acid.

Taxation of Arizona Mines.

The late Arizona Legislature placed in the new code provisions relating to the manner of making assessments that will, it is said, double the present assessment roll of the Territory, by increasing the assessments of mines. By the Act the final power to equalize assessments rests with the supervisors of each county, and the taxes on the assessment so equalized must be paid before an appeal to the courts to modify the assessment can be taken. Jury trial is not allowed, but the court shall hear evidence touching the actual cash value of the property assessed and is expressly prohibited from reducing the valuation of any property below the fair cash value of the property, or what the property would sell at for cash.

It is said that the law took its present shape as the result of a fight in the Legislature to divide Yavapai county in the interest of Jerome. In retaliation, the scheme is to assess the United Verde mine at $10,000,000, on which the taxes must be paid before Senator Clark's company can go into court to prove, if it can, that the mine is not worth that sum. The present assessment is said to be about half a million, mainly on the machinery and equipment.

IN Sardinia is now being treated slag remaining from mining operations there in the fourteenth century. At Villa-Massargia it yields 14% lead, 0.007% silver.

Notes on Tepic, Mexico.

To THE EDITOR:—It would be difficult to find an area in Mexico so little known as to mineral deposits as some portions of the northwest United States. The Spaniards are pioneer miners, and the evidences of their activity in Mexico and the later work of the Mexicans are found in all parts of the republic where mineral exists. So extensive and thorough was their knowledge of mineral occurrence, one might believe that there is not in Mexico an undiscovered mineral deposit. But it does not follow that nothing is left. On the contrary, much old work was superficial and serves now to point out deposits commercially valuable that might otherwise have remained undiscovered for many years.

It is a mistake to imagine Mexico an unprospected field. The points for investigation to-day are included in the question: Will the ore already determined yield a profit under the existing economic conditions?

With reference to the west coast of Mexico, the lack of transportation facilities accounts for the slowness of development. Mineral in paying quantities exists in the ranges from the head of the Gulf of California south to the Isthmus of Panama. But along that entire length of coast line there are but two natural harbors—both in the Gulf of California—and no railroads reaching into the interior mineral regions. Mazatlan, in Sinaloa, has importance as an ore shipping point, but ore handled there is brought in by mule train over hundreds of miles of trail. This condition renders machinery installation a serious problem, but not an unsolved one. It is astonishing, after traveling over a tortuous, precipitous trail in the Sierra Madres, to suddenly come upon a large mining and reduction plant.

Traveling east and inland from the coast of Tepic, the country rises by successive steps of basaltic flows of great thickness and extent and presenting every variety of this rock. The sources of these flows are individual eruptive points occupying the country in all directions from Tepic and extending north and east into Sinaloa and Jalisco. The basalt is the cap rock in the low parts of the country and affords the approximately level areas upon which the towns are built. Forming the mass and axis of the ranges, folded and broken by the later basaltic outbursts and intrusions, thousands of feet in thickness and weathered to craggy peaks, is the basal rock of the country—andesite. The entire region is made up of the two eruptives and allied species, the andesitic varieties largely preponderating. The line of basaltic eruption is north and south, the folds and breaks of the andesite being at right angles to it, forming the drainage lines and canyons of the Sierras, which render those mountains so difficult for railroad construction. The entire absence of sedimentary rocks for hundreds of miles around Tepic is remarkable. It is an obstacle to smelting at present, the only available lime being the calcite vein matter of fissures in some localities.

For the most part the fissures of this area follow the lines of folding and are within the lighter colored andesite rocks, but are also found along dolerite dikes as contact fissures or close to the contact, within either the dike or country rock. The veins are generally large and dip nearly vertical, with irregular mineral deposition. In most instances evidence of deposition by replacement is found with the ore bodies, and is especially noticeable in the veins occurring in anorthitite.

The gold content in the ores of Tepic, and of a large portion of Jalisco and Sinaloa, is very small and receives no special attention in treatment. It generally increases with the silver values. The ores over this area are much alike, as would be expected from veins occurring chiefly in andesite, rhyolite, dacite and dolerite, and carry most of the silver minerals. The surface ores, very generally worked out, are the chloride, bromide and chlorobromide of silver, and occasionally the rarer oxide, which I found in two mines in the Picacho district in Tepic. The sulphide, sulpharsenites and sulphantimonites are the chief sources of silver, the quantity derived from argentiferous galena and pyrites being relatively small. As a rule, the valuable mineral is finely disseminated through a quartz gangue and the ores require fine crushing to liberate it, which makes concentration difficult.

The coarsely crystalline sulphides carried in the vein matter—usually a mixture of galena, sphalerite, chalcopyrite and pyrite, easily concentrated—are rarely of a grade sufficiently high for profitable handling. The old patio and leaching by hyposulphite of soda or lime are best adapted to the common ores, although concentration is coming more into use. Under present conditions in this part of Mexico the minimum grade of ore permissible for profitable mining is about fifty ounces per ton.

Within 50 miles of Tepic are several districts in which the veins have been worked about 300 feet down to the general water level. The veins of these districts have similar ore characteristics. The ore bodies lack definite structure and the pay mineral occurs in irregular bunches. It is sometimes very rich. With few exceptions, indications of strength are lacking and the old workings confirm what this

lack would imply—that pay ore does not occur continuously but in irregular bunches and pockets.

There are two mines operated in Tepic, the Castellana and Zopaloti. At the former, concentration is employed; at the latter, hyposulphite leaching. The product is shipped to Hamburg, Germany.

Farther north and east, in Jalisco and Sinaloa, the ore bodies are larger and mining may be begun with much more confidence in their permanency, although Tepic excels, in many places, in economic conditions.

It is frequently asserted that the cheap labor of Mexico is a great advantage in mining. My observation and experience leads to the opinion that the advantage is more than counterbalanced by difficulties that progress in the United States has overcome. With reference to Tepic, it may be said that, taking into consideration accessibility, quantity, character and grade of ores, prices and terms asked by owners, it is not so favorable a field as other parts of Mexico and not nearly so favorable as many parts of the United States, for the investor in mines.

CLARENCE S. KING.

Use of Air Drills.

Has it been demonstrated that it is not practicable to use air drills except in hard ground?

If one were contemplating the running of 800 to 1000 feet of tunnel along a partly decomposed quartz ledge, would it be advisable to use a small air drill—size of tunnel, 6x8 feet?

If the 5-foot holes would shake the ground too much, necessitating timbering, would it pay to use an air drill and put in 30-inch to 36-inch holes?

Have stoping drills been used to run a drift, and, if so, what progress could be made in moderately hard rock?

Information on this subject will be much appreciated.

San Francisco, Cal. W. M.

The following is in answer to the above:

If ground is hard enough to drill, power drills can be used to advantage. If the ground is not very hard, do not put in as many holes. A tunnel 6x8 certainly could be run with power drills to a profit over hand labor. He must expect some backs with an 800-foot or 1000-foot tunnel, and is it not likely that in depth his ledge will get hard? Yes; we stope, raise and drift, often with the same drill, 2¼″ Giant. When we first put in air drills we used nothing but the 3⅛″. We did not stope much with them—mostly drifting and raising. Now we have no 3⅛″ in use in the mine, 2¾″ being the largest. We now use the 2¼″ for nearly everything. We have concluded that most people are given to the use of too heavy drills. We are satisfied that we can drill almost any kind of ground with a 2¾″ drill. We use water with all of our machines, which is of great help in every way. Twelve hundred feet of our present shaft was a raise; we cut down the raise to make a 12-foot wide shaft; most of the cutting down was done with a 2¼″ Giant drill, and frequently most of the five or six holes were in hard greenstone. So we proved we could drill nearly everything with a light drill (100 pounds).

With our 2¾″ and 3⅛″ drills we have two men; with the 2¼″ only one in any position. The total cost of a drift we ran, both with 3⅛″ and 2¼″ drills, also the cost of a hard greenstone crosscut with a 2¼″ drill, is appended. It is to be noted that the 2¼″ drill is the one we stope with; we only use the 2¾″ in drifting and raising:

Drift.	Feet run in each month.	Cost per foot.	Drill.
"	57	$3 87	3⅛″
"	40	4 57	3⅛″
"	60	4 26	2¾″
"	18	4 36	2¼″
Crosscut in greenstone	36	4 00	2¼″
Drift	17	3 38	2¼″

The above is the whole expense per foot of drift, labor, materials, caring dirt. In some places the drift was very hard, but always a wall to break to.

The labor of breaking the ground alone by contract, single or double-hand, would in no case have been taken for less than $5, and much of it for not less than $10 per foot. L. B. J.

Forbestown, Cal.

Inches of Water Carried.

How many inches of water will be carried by a 4-inch pipe 2 miles long, supplied by a 12-inch pipe ¾ mile long—fall from head of 12-inch pipe to junction with 4-inch, 50 feet; from junction to discharge point, 100 feet? How many inches if a 6-inch pipe be substituted for the 4-inch? How many if an 8-inch be substituted?

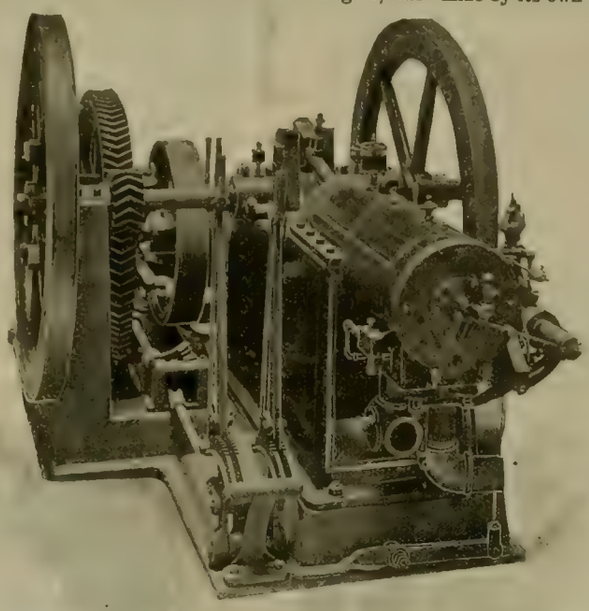
Bishop, Cal.

Approximately, in the first case, 10 miners' inches; in the second case, 30 miners' inches, and in the third case 60 miners' inches. These figures are, however, only approximate, as the condition of the pipes or the number of bends and style of intake are not mentioned. The first condition will be very bad hydraulic practice to put in, viz: a 12-inch pipe and a 4-inch pipe, and one that should not receive practical consideration.

THE latest consolidation in the mining industry reported to be under consideration is a syndicate to control the entire output of zinc of the Joplin district, which produces seven-eighths of the product of the United States.

A New Gasoline Hoist.

The accompanying half-tone from a photograph of the gasoline hoist, manufactured by the Machinery & Electric Co. of Los Angeles, Cal., shows many of the advantages claimed for this machine. The entire management of the machine, including the changes in speed, is done from the head end of the engine, the operator always facing the mine shaft as well as his engine. It has helical or V-tooth gears and supported out-board bearing, a double-faced iron friction designed to lift 2000 pounds with the pressure of one finger, the friction also intended to be used in case the brake fails. Either post or strap brake is furnished as preferred. The hoist also has a variable speed control arranged to be operated at 100 revolutions per minute up to the limit of governor control. In the gasoline engine which operates this hoist the spark is located in the direct path of the incoming charge, where the points are always clean and the charge always rich enough to burn quickly, the location so designed that when the engine cuts out, the exhaust is held open and a stream of cold air passes over the points, the sparker stopping all motion when the engine cuts out. These features are designed to enable the M. & E. engine to run light all day and take but one shot at a time, each of the same force.



New Gasoline Hoist.

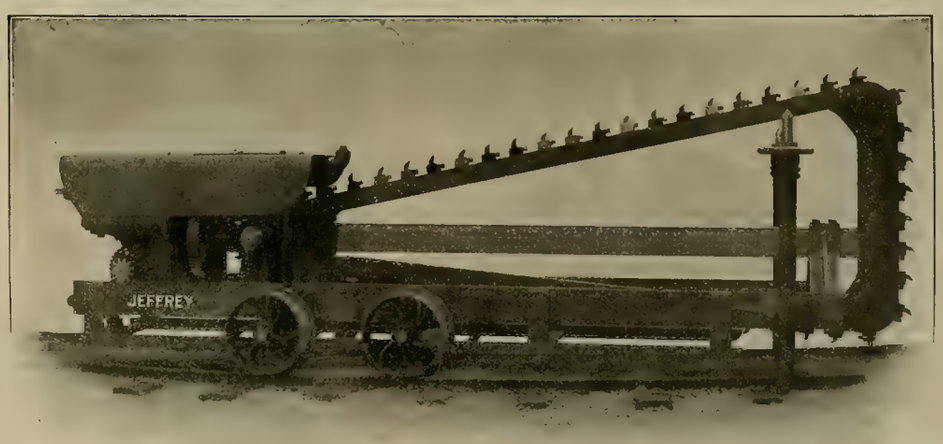
The Jeffrey Electric Power 48-Inch Cut Shearing Machine.

The accompanying illustration gives a clear idea of the latest designed shearing machine for coal mining, manufactured by the Jeffrey Manufacturing Co. of Columbus, Ohio.

Fig. 1 shows a side view of the machine mounted on truck wheels. It is not necessary to remove these wheels when shearing the coal. There is no separate truck; the wheels run on gudgeons fastened to specially designed cross ties that support the outside frame of the machine.

The rack has open teeth, so that any obstacle that may lodge on it is pushed through by the feed pinion teeth, which avoids clogging and undue strain on the teeth. The cutting chain is interchangeable with cutter chains on Jeffrey standard undercutting machine, and runs over so that as the bits come in contact with the coal all the cuttings are carried down and brought out at the bottom of the kerf, where they are easily gotten at to be removed, if necessary. This machine has been fitted with trolley pole so that it may be moved from one working face to another in mine by its own power, thus avoiding delay incident to moving by mules or horses. It is built in sizes to shear to a depth of 6 or 7 feet, each cut being either 36″ or 48″ high. When a vein of coal is to be sheared, which measures more 36″ or 48″ thick, columns are arranged to side of machine upon which it can be raised or lowered readily by means of a ratchet.

This is only one of the styles of coal-cutting machines which the Jeffrey Mfg. Co. build; their line also includes electric and compressed air breast or chain machines, built for either thick or thin vein coal, electric locomotives, electric and compressed air drills and all kinds of elevating, conveying and screening machinery for handling coal.



Shearing Machine for Coal Mining.

Change in Steel Making.

The Bessemer process of making steel is falling into disuse, and the crucible process of making steel is also on the wane to some extent. Both are falling victims to the practice of making steel by the open-hearth process. Gradually the latter is displacing the functions of Bessemer product, and as the quantity of ore, known as Bessemer ore, decreases, so the method will fall more into disuse. While furnaces to increase the output of open-hearth steel are being built that will aggregate more than a thousand tons per day, no Bessemer coverters are being erected in this country.

Open-hearth steel is being used in many places where crucible steel formed the exclusive product formerly. The open-hearth product is making annual inroads on the crucible make. So much so that the Crucible Steel Company of America is building an open-hearth plant to supply this demand.

Hammering or forging crucible steel by a succession of blows was formerly considered the only proper method to treat steel. The hydraulic forge or squeezing process and the rolling mill are displacing the hammer to a large extent. There is no questioning the quality of hammered steel, but the loss is too great. This is incidental to the fact that hammermen are human, and have not the necessary skill or genius to guess when a piece of steel should be struck and when not. By the hammering process one part is struck a blow while at a red heat, another part while at a cherry red, and another while the metal is black. Each successive blow creates a new structure. Where the metal is at a proper heat the granules will be forced into homogeneity; where the steel is cooling rapidly, it will jar the grains apart.—American Manufacturer.

A GERMAN patent describes "the Dile apparatus" for production of phosphorus by action of an electric current on a mixture of phosphoric acid with one-fourth of its weight of lamp black. The positive electrode is at the bottom of a covered cylindrical vessel, while the negative passes through a hole in the cover and can be lowered or raised by a screw;

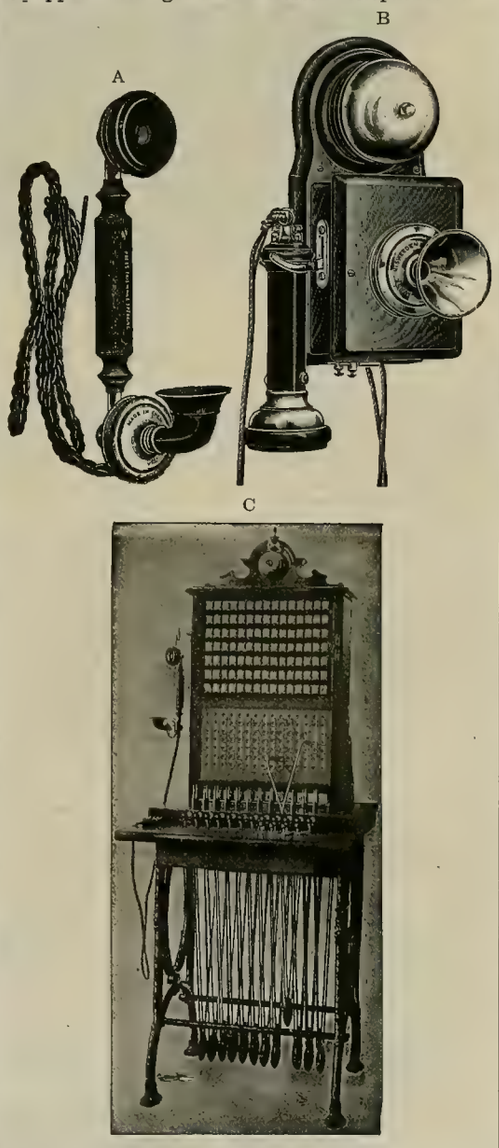
it is claimed that the apparatus will work continuously without the necessity of cleaning out the residue, as only carbonic acid, phosphorus and a small amount of light ash will be obtained, the raw material being introduced through a hopper at the top.

Working Silver Ores in Pachuce, Mexico.

At Guadalajara, Jalisco, as related in Mines and Minerals, the ore arrives at the mills direct from the mines in big pieces (about 10-inch cubes), is broken to small pieces (about 1½ or 2-inch cubes) by crushers and afterwards reduced, with a supply of water, to a fine pulp in stamp batteries or Chilian mills so that it will pass through a 90-mesh screen. The fine pulp is delivered by launders to settling tanks, which remove the water, and the pulp is then placed in large, shallow tanks and exposed to the heat of the sun in a yard until the ore is dry. In the rainy season the ore is dried on iron plates over a furnace. When the pulp is dry it is taken to bins over the "tonnels" (amalgamating barrels). The charge for each tonnel consists of from three to four tons, which is mixed with about 13%—by weight—of common salt. The ore and salt are charged into the tonnel with hot water. The water is measured so as to obtain a stiff pulp which will support the amalgam in place of allowing it to remain in the bottom of the barrel. (It is possible to take the pulp in the hands and press it into a ball, plainly showing the marks of the fingers.) The tonnel is run for about half an hour and then the "reactrio" (reagent) is charged into the tonnel. The reactrio is a solution of protochloride of copper in a saturated common salt solution, and is prepared in the following manner: A saturated solution of common salt is prepared in a wooden tank and sulphate of copper added. This is boiled by a current of steam. The reaction which ensues reduces the sulphate of copper, forming bichloride of copper and sulphate of soda. The solution is green and all the sulphide should be dissolved and transformed in half an hour. Metallic copper is then added and two ounces of sulphuric acid, which is intended to clean the surface of the scrap copper. The solution is again boiled with steam. In this case metallic copper acts on the bichloride of copper to form a protochloride of copper, some of the metallic copper being dissolved in the action. This reaction requires about half an hour. The liquid, which was at first green, changes color as the reaction advances. The proper color for the end reaction would chemically be a clear solution, but generally it is the color of cognac, caused by the suboxide of copper which is reduced from the chloride by the atmospheric air, thus giving the liquid the color of cognac at the end of the reaction. The liquid is kept hot so as to keep the chloride of copper in solution. To test the liquid, a little of the hot solution is poured into clean cold water, when there should be a white precipitate of protochloride of copper. The solution is kept and used hot, on account of the fact that the protochloride of copper is only soluble in hot salt solution. It is for this reason, also, that salt and hot water were added to the tonnel when it was charged. The reactrio is charged into the tonnel and after it the mercury. The tonnels are then run for about six hours, when the amalgamation should be ended. Plenty of water is then added to wash out the pulp which is allowed to flow into the tanks where the amalgam is separated. Generally there are three wooden tanks for washing the pulp and these are provided with agitators. The reactions which take place in the tonnel are as follows: Any sulphides of silver are converted into chlorides of silver, the protochloride of copper being at the same time converted into a sulphide of copper. Previous to introducing the mercury into the tonnel it has been amalgamated with zinc or lead, and the chlorides of silver act on these metals, converting them into chloride of copper or chloride of zinc, the metallic silver formed being taken up and amalgamated by the mercury. If this precaution is not taken the mercury itself would be attacked by the chloride of silver, to form chloride of mercury and metallic silver, thus causing serious loss of mercury. When the silver is present as a double sulphide of silver and antimony or arsenic, chlorides of silver and antimony or arsenic will be formed by the protochloride of copper, the chloride of silver being reduced by the zinc or lead as in the case above. Native silver will be taken up at once by the mercury, while chloride or bromide of silver will be decomposed by the mercury, zinc or lead and amalgamated. The tonnels have four beams of wood extending longitudinally through them to aid in moving the mass. The mechanical losses of mercury in this process are very small and about 95% of the silver is saved. If galena, pyrite or manganese is present it will maintain its silver and may be concentrated from the tailings. Sometimes, when much galena is present, the ore is concentrated first to obtain the galena as a concentrate, which is sold to the smelters, the tailings from the concentrates being treated as above described. The object of this concentration is to remove the galena previous to the amalgamation, as on account of its great specific gravity it interferes with the cleaning up of the amalgam. When mercury is being lost mechanically, more water is supplied to the washing or cleaning tanks. If the ore contains greasy clay, it interferes seriously with the amalgamation, on account of the fact that the clay covers the surface of the mercury. Any free gold in the ore is obtained in the amalgamation. At Pachuce the ore is generally obtained in quartz and with very little clay, the silver being mostly in the form of a sulphide, together with considerable polysulphide of silver, antimony and arsenic and a little argentiferous galena. This ore is successfully treated by the above process. In other places, where the ore contains copper minerals and complex sulphides, it is first roasted with salt, which converts the silver into the form of a chloride previous to amalgamation.

Telephones in Mines and Hotels.

In the modern mine telephones are now considered part of the equipment. After many unfavorable experiences, engineers and superintendents have discarded the cheap and inefficient telephone apparatus and are choosing more for quality and durability than price. The same way in hotels, the new Hotel Essex, N. W. 56th St. & Madison Ave., New York City, is equipped with genuine Ericsson telephones and



Telephone for Mines and Hotels.

switchboard. The room telephones are all of the hand micro-telephone pattern, as shown in cut A, each fitted with a flexible cord of sufficient length to enable the patron to call the office, or to answer a call if desired, without rising. When through using, the releasing of a lever in the handle makes and breaks all necessary connections and it is not necessary to replace on a hook, as in ordinary telephones. In operation, the office is called by simply pressing the contact in the handle of the hand micro-telephone, which act throws the drop at the switchboard. The operator connects in the usual manner, answering the call, and, if desired, calls some other suite and enables the two to converse. As shown in cut B, the wall telephone is compact and takes small space. It is fitted with the standard Ericsson receiver and transmitter. In operation it is used in the usual way, the act of taking the receiver from the hook sending the call for the operator in the office. With both instruments, when the line is released, the operator is at once notified and quickly disconnects. The switchboard is shown in cut C.

In addition to this system, the Ericsson Telephone Co., 296 Broadway, New York City, make a number of different systems and telephones of special design and finish for special uses, including intercommunicating patterns and for exchange use. They make a specialty of supplying mines with durable and satisfactory telephone service.

Steam Engine Economy.

All prime movers using steam are in reality heat engines, the steam being merely the carrier of the heat from the boiler to the engine. Water or steam may be used over and over again, but the supply of coal or other fuel—the real source of the expense—must be kept continuous. It follows that the only scientific and accurate mode of expressing engine economy must be in terms of the amount of heat used per unit of power developed in the unit of time.

To thus determine engine economy there must be given, besides the consumption in pounds per I. H. P. per hour, the temperature of the feed water and the pressure or temperature and quality of the steam. With this data and the aid of steam tables the heat units required per minute or load can be readily determined.

To illustrate, suppose an engine consuming 16 pounds per I. H. P. per hour and the additional data: feed temperature 160°, steam pressure 150 pounds gauge, quality 98% dry, then using the steam tables:

	Degrees.
Temperature of steam is	365.9
Heat in 1 pound water at last temperature	338.0
Heat in 1 pound feed water at 160° = 160 — 32 =	128.0
Heat needed to raise 1 pound of feed to boiling point	210.0
Latent heat 1 pound steam	855.6
Ninety-eight per cent of preceding	838.5
Heat required per pound moist steam formed = 210 + 838.5 =	1048.5

Heat required for 16 pounds = 16,776° = heat per I. H. P. per hour.

Heat required per I. H. P. = 16,776 ÷ 66 = 279.6°.

These last statements are accurate and complete, and make possible the determination of the efficiency of the engine. One H. P. = 33,000 foot pounds of work per minute. In heat units (B. T. U.) this is 33,000 ÷ 778 = 42.42. Then in the illustrated case it has required 279.6 heat units to get the equivalent of 42.42. The efficiency is thus 42.42 ÷ 279.6, or 15%.

The importance of the efficiency so determined for comparisons of economy is illustrated in the following case:

(A) Steam consumption 18 pounds, temperature feed 180°, steam pressure 85 pounds, quality 94% dry.

(B) Steam consumption 17 pounds, temperature feed 100°, steam pressure 200 pounds, quality 99% dry.

Determining as before, using the tables, the heat required would be: For A, 294.4° per minute, and for B, 318.3° per minute; so that while by the steam rating B would appear to be the more economical, by the heat rating exactly the reverse is the case, A being the more economical by 8%.

Another case where the rating in terms of steam or water per I. H. P. per hour may give a very incorrect idea of the real engine efficiency is where the engine is located a long distance from the boiler, with a poorly protected steam pipe connection. Under such conditions much heat will radiate through the steam pipe and not reach the engine at all, and the real engine supply is part steam and part water, instead of being all steam.—Condensed from The Engineer.

It is fairer to the engine to reduce the consumption to heat units, the thing really consumed. The wide margin between the theoretical perfect utilization of all the heat and the heat actually used would then be forcibly brought to the attention of every steam user, and would prove a constant stimulus to improvement, tending to raise the average efficiency of engines, even if no startling changes in practice would result.

THE Alaska Commercial Co., Alaska Exploration Co., Seattle-Yukon Transportation Co. and Empire Transportation Co. have consolidated into two new New Jersey corporations, the Northern Navigation Co., which will take over the transportation business of all the four, and the North Commercial Co., which will take over and do a strictly trading business. Each of the new corporations is capitalized at $7,000,000. The territory covered by the operations of the companies combining includes St. Michael, Behring Sea, Cape Nome, Port Clarence and Yukon districts. Thirty-six river boats, but no ocean steamers, were transferred, and no mining properties were transferred, though all of the companies combining own in part or whole many mines. The North American Trading & Transportation Co, the Chicago Corporation, in which the Cudahy's and Weares are interested, did not go into that combination.

THE Iron Age says that in this country the wage earner represents not a class, but a condition—as temporary as he may choose to make it. "The conditions of emancipation from wage service are industry, self-improvement and the homely virtues of economy and thrift. The relation of those representing the different conditions in the industrial scale is

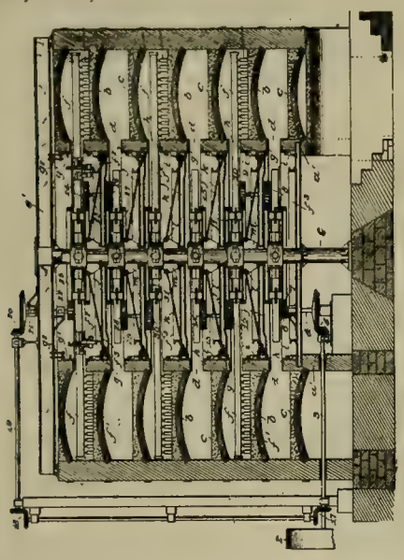
constantly changing in obedience to a natural law much like that which, in the ore-jigging operation, separates masses of matter according to their respective specific gravities. We find very few employers who have not at some stage of their careers been wage earners—not in an amateur way, but because no other means of starting in life was open to them. For this reason it is misleading and mischievous to talk or think of such impossible abstractions as a 'working class,' a 'laboring class' or a 'wage-earning class.' These so-called classes may and do merge together in a way which would be impossible if separated by any real class distinctions. Hence we are compelled to share with most students of economic and social problems the disapproval of any plan for assisting the wage-earner which puts him on any other plane than that which every other capitalist, large or small, must occupy. Self-reliance and independence of judgment are and must ever remain his chief aids to advancement in life."

Mining and Metallurgical Patents.

Patents Issued April 2, 1901.

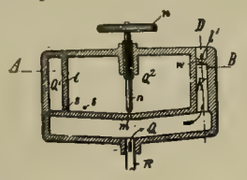
Specially Prepared for the MINING AND SCIENTIFIC PRESS.

ORE ROASTING FURNACE.—No. 671,071; R. F. Pearce, Butte, Mont.



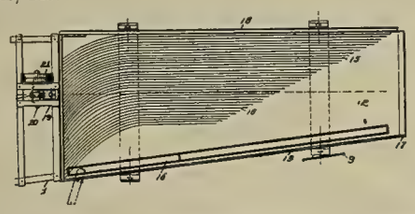
Combination with outer solid wall and inner horizontally-slotted wall, of column spaced apart from inner wall, and cantilever support for portion of inner wall above slot, comprising trussed chord projecting from column and connected with inner wall.

QUICKSILVER RECEIVER.—No. 671,069; F. Kaeferle, Hanover, Germany.



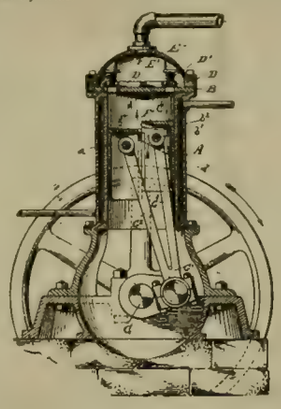
Combination of chamber Q with entrance R for mercury and fluid, a vertical conduit in communication therewith, a partition W at upper end, means of communication, l, below partition between conduit and annular chamber Q′ placed above chamber Q, means of communication, l′, above partition between chamber Q′ and atmosphere, accumulation chamber Q^2 concentric with Q′ having holes, s, in wall C for admitting mercury from annular chamber, and provided with orifice, m, at lowest part for return of mercury to chamber Q and screw spindle, n, for closing orifice.

ORE CONCENTRATOR.—No. 671,276; A. Fritsch, St. Louis, Mo.



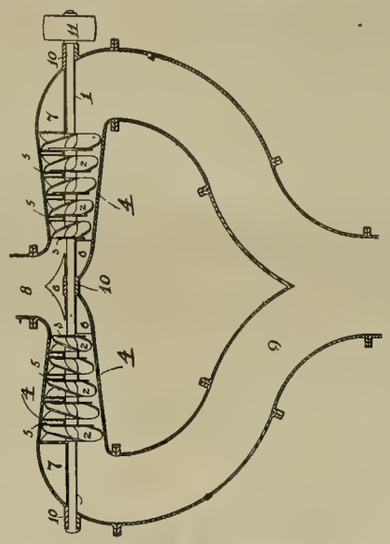
A base, standard frames supported above, cams under certain frames for raising and lowering them, lever for operating cams, lock for retaining lever and cams in adjustment, table supported to swing between frames, means for passing material onto table in thin stream, series of curved and tapering guides regulating movement of ore, operating shaft, means operated by shaft for forcing table rearwardly whenever rotated, and separate means for drawing table to front.

AIR COMPRESSOR.—No. 671,044; G. S. Binckley, San Francisco, Cal.



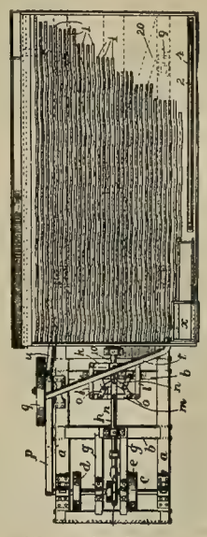
Combination with compressing cylinder, of piston of relatively movable sections, constituting air admission valve during one stroke and compressing piston during opposite stroke, drive shaft and connecting rod connections between each piston section and drive shaft, connecting rod connections having separate pivoted connections with respective sections, so sections advance toward and from each other upon changed angularity of rod connections during revolution of drive shaft.

PUMP.—No. 671,090; J. S. Morton, Oakland, Cal.



Means for raising fluids, comprising series of helical runners secured upon rotatable shaft in combination with similar series of reversely formed helical runners, each element of each series separated from adjacent element and provided with a plate upon one face of less than its diameter but larger than that of hub and means to prevent rotation of fluid between adjacent elements of series of runners.

ORE CONCENTRATOR.—No. 671,348; J. H. Michelsen, Butte, Mont.



Combination with main frame, vibratory table mounted thereon, means carried by frame for adjusting height of one side of table, and means for delivering material upon table; main driving shaft, pitman connected to operate from main shaft, connecting-rod connected to table, frame secured to connecting-rod, compound toggles mounted in frame, one pair of toggles forming connection between frame and main frame, and toggle forming connection between pitman and toggles.

METHOD OF TREATING ORES. — No. 671,389; M. Seligsohn, Denver, Colo.

Process of amalgamation consisting in introducing into ore pulp air impregnated with two or more chemicals by mutual reaction to promote amalgamation and prevent sickening of mercury.

DISTILLATION OF PETROLEUM.—No. 671,078; J. T. Davis, San Francisco, Cal:

Producing residuum for use as binder for artificial fuel, in incorporating with crude petroleum suitable oxidizing agent, such as bichromate of potash, distilling petroleum to temperature above 600° Fahrenheit, below carbonizing point of residuum, introducing steam into petroleum from below, in its passage upward to dissolve oxidizing agent, continuing distillation at temperature given, until residuum has reached condition desired.

Dredging Diffiulties.

Some difficulties encountered by dredges upon river and beach claims of the west coast of New Zealand are the obstructions from huge boulders or from buried timber. The first obstacle that is met with in any attempt to overcome them is the fact that the work is carried on in the dark. The dredger buckets meet with large logs which may lie endwise or crosswise. These must be removed by finding out the position of the obstruction and adapting such means for its removal as would be used on land. The first requisite, then, is to find out the nature and the position of the obstruction, which means seeing it. There seems no great difficulty in the way of constructing apparatus to see at the foot of the ladder. A light, water-tight cylinder fitted with a suitable glass at the bottom could easily be constructed. Perhaps more lenses than one would be an improvement. This "water telescope" could be let down right on to the obstruction, so that there would be little intervening water to look through. Probably also an electric light, with a reflector, to light up the obstruction, might be necessary. It might be convenient to adopt such telescopes to each side of the ladder, so that they might always be available. Having by some means located the obstruction, the problem of its removal would be much simplified. In the case of logs, connection would have to be made with a steel rope running through a pulley behind the dredger to a winch on deck. This connection might be made with dog hooks, or it might, indeed, be necessary to have a diving apparatus and a diver to make the attachment. Or it may be found necessary to have each ladder fitted up with an air-lock cylinder for this purpose. In conjunction with this, a circular saw driven by chain gearing, to cut up the logs, will be required. —Condensed from New Zealand M. & E. Journal.

Tamping Blasting Charges.

TO THE EDITOR:—Is tamping necessary in charging holes in rock with dynamite? If so, why? These are questions I have asked practical miners of from one to fifty years' experience without getting a satisfactory answer. Some are bold enough to say what kind and how much tamping to use on top of dynamite charges, but none say why it is necessary to use tamping at all. Text-books used in some mining schools say what kind of rods should be used in tamping holes, thereby assuming that tamping is necessary. One writer in the MINING AND SCIENTIFIC PRESS said: "Only enough tamping to exclude the air from the dynamite is necessary."

I have blasted holes in many different kinds of rock in practical work in mines, from British Columbia to Mexico, with small amount of tamping—enough to exclude the air from charges—and with no tamping at all, without being able to appreciate the difference between the efficiency of the blasts with and without tamping.

Say one had a 5-foot hole charged with 3 feet of dynamite, would it not be better to have the resistance of the air in the unoccupied portion of the hole (2 feet), than to pump the air from the hole, and seal the collar of the hole with a thin sheet of air-tight sealing wax? PRACTICAL MINER.

MINING SUMMARY.

Specially compiled and reported for the MINING AND SCIENTIFIC PRESS.

ALASKA.

Patrick Clark is reported to have bonded quartz claims near Nome. The ore body is said to be several hundred feet wide and to be free milling.

The Yakima mine, on Douglas Island, is reported to have been sold for a large sum.

The Lucky Chance, in Sitka district, claims to have a shoot of $50 to $75 ore blocked out. A wire tramway has been built to connect the mine and 5-stamp mill.

W. A. Mix will hydraulic in Porcupine district this season.

The Alaska Steam Coal & Petroleum Co., J. Hamilton manager, has commenced drilling for oil at Kayak, near Cook Inlet. The company has a standard rig and expects to have to drill 1200 feet. Petroleum has been noted seeping freely from the ground at Kayak.

ARIZONA.

COCHISE COUNTY.

The Lake Superior & Western Dev. Co. have taken over the eleven claims at Bisbee which they have been developing under bond. The price paid is reported as $500,000; J. L. Merriland is Supt.

COCONINO COUNTY.

Several hundred placer locations of supposed platinum deposits have been made by M. C. Sharpneck and A. A. Coupland of Coconino for Eastern people. The platinum deposits are said to exist in Cataract canyon. This has been exploited once and demonstrated to be without foundation.

GILA COUNTY.

It is reported that the management of the Ray Copper Co. has passed from the English stockholders to the Seligmans of New York and L. Zeckendorf of Tucson.

Surveys are being made to develop the water power of Salt river. It is intended to supply 3000 H. P. to Globe and vicinity. C. M. Clark of Globe is at the head of the proposition.

From Old Dominion C. M. & S. Co., Globe, statement from formation of company to Jan. 1, 1901: Value of copper, silver, gold produced, $3,567,558; less cost of production at mines and smelter and electrolytic refining, $2,161,293; all expenses of handling copper, such as freight, copper charges, commissions and expense account, $553,305; total expenses, $2,714,597. No sulphide ores have been found, but oxidized ore bodies continue in depth. The production of copper for 1900 averaged 750,000 pounds monthly.

The Black Warrior C. Co. are reported as intending to add acid works and a refining furnace to their already large plant at Globe. The company is at present without fuel to operate, owing to the continuance of the coal strike.

MARICOPA COUNTY.

The new owners of the Vulture mine at Wickenburg, G. W. Sanders, superintendent, are reported to intend increasing the mill water supply by a new pipe line from the Hassayampa river, adding to the cyanide plant, and building a concentrating mill for the low-grade ores.

MOHAVE COUNTY.

H. Hubbs, Kingman, claims to have struck a vein of silver-lead ore in the Wallapai mountains.

Ore has been found in lower workings of the Empire mine, Kingman, that is said to be rich. The mine is bonded to J. P. Finegan and A. Conkey of Chloride.

PINAL COUNTY.

W. D. O'Neil has bonded the Bay State mine, at Florence. At a depth of 200 feet the vein is said to be large and to average close to 100 ounces of silver.

YAVAPAI COUNTY.

The Congress mine, on the Santa Fe, Prescott & Phœnix R. R., is sold by the Congress G. M. Co. to Eastern men for $2,000,000. The purchasing company will be headed by E. B. Gage, now president Congress G. M. Co. W. Miller of New York and W. W. Grout of Vermont are interested.

YUMA COUNTY.

C. H. Gray's mine, 45 miles west of Ehrenburg, is reported to have yielded $17,000 from a recent mill run.

CALIFORNIA.

ALAMEDA COUNTY.

Manganese ores are mined at Livermore by J. W. Merchant. The ledge is worked in open cut and the ore is said to carry about 70% mineral, black oxide.

AMADOR COUNTY.

It is reported that Alvinza Hayward will build an electric power plant on Dry creek, near the Centennial mine, Plymouth, to supply the northern portion of Amador county with power.

The Con. Jackson Co. propose to start work on the Pleming mine at Jackson.

N. Mirionvich and Glavich Bros. cleaned up $4000 from a twelve days' run of their gravel mine near Oleta.

BUTTE COUNTY.

The Golden Trout mine, N. Lambert foreman, have surveyed a ditch to bring the South Fork and tributaries to the mine for power. They expect to develop 500 H. P. A 20-stamp mill is being built.

INYO COUNTY.

Discoveries of nitrate beds are reported from Death valley equal in quality to the Peruvian deposits. Three claims are reported to have been sold recently.

KERN COUNTY.

The Crœsus Co. expect to put in immediately a 40-ton cyanide plant on the Pinmon mine, Randsburg. They estimate 8000 tons of tailings on their dump already.

The Butte mill run of 75½ tons yielded $10,300 in gold.

W. Inman has struck a ledge of $30 rock in the Kinyon, Randsburg.

MADERA COUNTY.

The N. Y. Exploration Co. has acquired the old Fresno Enterprise mine, near Ahwanee. It will be operated by Capt. H. H. Todd.

MARIPOSA COUNTY.

English people are said to have bought the Red Cloud mine, near Coulterville. W. P. Jones is superintendent.

The Mariposa Com. & M. Co., J. H. McKenzie manager, have bought the Brown mill, below Tuttletown, and are moving it to Princeton, where it will be added to the plant on the Mariposa grant. The company, so the manager states, would like to purchase another twenty stamps, and parties having such a mill for sale can address Mr. McKenzie at Mt. Bullion postoffice, Mariposa county.

At the Hite Cove mine 100 tons of tailings are cyanided daily. It is estimated that there are 40,000 tons of tailings which will yield $5 and cost for treating 50 cents per ton.

MONO COUNTY.

The Blue Vein mine, at Bodie, is being prospected on the 200-foot level. The owners are said to intend to put up a 5-stamp mill and tramway.

NEVADA COUNTY.

At the Champion mine at Maybert a tramway, 10-stamp mill and compressor have been installed. Supt. English expects to run the mill on a recent strike of a large ledge of pay ore.——At the old Yuba mine a good-sized ledge has been uncovered and the mill has been running for the past month.——Development work is going forward rapidly at the Eagle Bird, superintended by Alex. Wilson.

The Wright & Baily quartz mine, Sweetland, is sold to San Francisco men for $8000. Shafts will be sunk on the property.

PLACER COUNTY.

The Pioneer-Lynn G. M. Co., Towles, report a small cleanup at the mine during March.

At the Eureka Con. drift mine, Centerville, a lead of pay gravel has been struck on the west rim 12 feet up from the pay channel lately cut by the bedrock tunnel.

SAN BERNARDINO COUNTY.

A strike is reported in the Ovid district, near Victor, a ledge 8 feet wide opened by a 60-foot shaft and crosscut. The find is iron oxide carrying wire gold and native silver.

SAN DIEGO COUNTY.

The Golden Cross at Hedges is still in litigation. The Free Gold M. Co. is suing J. Spiers and others for the possession of the mine, $50,000 rents and $200,000 damages.

SHASTA COUNTY.

J. Fisher and F. Ormsby are operating the Globe at Igo. They have made several shipments of concentrates and selected ores.

The Clover Creek Cinnabar Co. are sinking on the ledge. The cropping indicates about 20 feet width.

The Gibson and Apfel ranches, on Clear creek, near Redding, have been bonded by a dredging company and prospected by a drill. It is reported that a dredger will be installed.

J. W. Turner of Eureka has bonded the Harrison group of copper claims on Cow creek at $45,000, operations to begin within ninety days.

At Redding is being tried in the Superior Court the suit of the Balaklava M. Co. vs. the Iron Mountain Investment Co., the development branch of the Mountain Copper Co., for possession of the Balaklava copper mine near Copley and for $25,000 damages and costs. The action arises from a $200,000 bond which the Iron Mountain Co. held upon the Balaklava, and involves a tender of payment made by telephone after bank hours on the last day of the bond's life. The Iron Mountain Co. will probably lose the suit.

J. R. DeLamar has transferred to the Bully Hill Copper M. & S. Co., in consideration of $2,249,000, the Bully Hill mines and smelting plant near Copper City, 26 miles northeast of Redding.

SIERRA COUNTY.

F. C. Le Blond and W. E. Olmstead have applied to the U. S. Debris Commission for permits to hydraulic the Chaparral Hill mine, depositing tailings in Goodyear creek. Other applicants from this county are Ah Lung to mine Fuller Flat mine near Scales, and J. H. Skinner the Lava Point mine at Hepsidam.

SISKIYOU COUNTY.

The Siskiyou Hydraulic M. Co. are working 100 men at their hydraulic mines in the South Fork and Wildcat creek, Callahans.

The Consolidated M. & D. Co. are working two hydraulic claims at Callahans and have bought up large tracts adjacent, which they propose to work by dredging.

Carlock & Morrison are developing their quartz mine, near Etna, on a large scale; twenty-five men are employed.——P. Thompson, Yreka, has taken out a 17-ounce nugget from Humbug canyon.——Rich pay is said to have been taken out on the South Fork of Scott river from gulches and tributaries, especially Boulder creek. A ditch is being constructed at Frenchtown, where claims have been bonded by a French company.——A. C. Brokaw, Etna, is working the R. H. Campbell hydraulic mine, Quartz valley.——Quigley & Geney, Etna, are reported as contracting with Eastlick Bros. to work the Quigley & Geney claim, Oro Fino, by elevators.

TRINITY COUNTY.

On the Lawrence mine, near Trinity Center, the ledge in the main tunnel is from 6 inches to 3 feet wide. A lower tunnel has been started to open the vein 200 feet down and a mill is projected to replace the present 5-stamp plant.

The C. P. R. R. land department is protesting in the land office at Redding the issuance of a placer patent to 240 acres of land claimed to include the Closs & McClary channel. The mine claimant, M. H. MacIllwaine of Abrams, has offered testimony to show that 15 to 40 feet depth of pay gravel existed on the land.

The second tunnel on the Sweepstake, Weaverville, struck gravel near the rim rock, which is pitching down.

The Ajax group, Weaverville, is bonded to C. D. Galvin. The group is on the Sweepstake channel.

Cochran, Brady & Tourtellotte have bought the boiler and hoist of Adele mine, at Lewiston, for the Lappin mine, Deadwood, and will sink from the 100-foot level to 200 feet, and if the ledge holds will put up a stamp mill.

TUOLUMNE COUNTY.

Superintendent C. L. Lang states that contracts will soon be let for grading for the new hoist and mill at Big Oak Flat, where a shaft will be put down.

McSorley Bros. are sinking on the Emma mine, Campo Seco.

Ogden & Peabody have struck pay gravel in their mine on the White Lead at Columbia.

YUBA COUNTY.

At the Golden Trout mine, A. J. Waterhouse, Supt., Strawberry Valley, the shaft is down 110 feet and tunnel in 240 feet. Thirty men are employed. The ledge shows excellent rock. A 20-stamp mill is now being constructed.

The last obstacle, as far as known, in securing land on which to construct the Deguerre debris dam on the Yuba river has been removed by a compromise of the condemnation suit brought by the Government against S. Harriman. The Government now has the title to all of the land.

COLORADO.

BOULDER COUNTY.

The Great Enterprise, at Eldora, C. W. Shanan Supt., is working twelve men.

The Blue Grass M. & M. Co. is reported to have struck 2-ounce ore in the Senator Tillman, near Phœnix.

The Three Strikes M. Co., at Eldora, is shipping regularly, some being high-grade ore containing petzite.

C. L. Schellenger, manager Denver Tunnel Co., Boulder, states that they will build an extensive plant of machinery soon and drive the T. & D. tunnel to cut four veins on the Denver group.

Mr. Taylor, Magnolia, has struck ore in his tunnel in the upper camp assaying ten ounces gold and upwards.

CLEAR CREEK COUNTY.

The Abbandwal M. Co., so Manager J. Owen states, has decided to put machinery on the Morning Star mine, at Idaho Springs. He says the improvements will consist of boiler, engine and compressor plant.

The Colorado & California M. & M. Co. has added four new concentrators to its mill at Idaho Springs, to treat ore from the Crown Point and Virginia mines.

Doherty & Gordon, operating the De Lesseps mine, Idaho Springs, say they will install a 40 H. P. gasoline hoist. They intend sinking to drift under the ore body now exposed.

DOLORES COUNTY.

The reopening of the Atlantic Cable M. Co. mine at Rico is reported after a month's trial run of the mill to be a success. The mill has been changed to a stamping and concentrating plant and is treating zinc-lead ore.

EL PASO COUNTY.

The old Lincoln mine, near Gillett, will be started again.

GILPIN COUNTY.

The Ohio tunnel, Black Hawk, owned by the Oro M. & M. Co., H. R. McClellan of Denver manager, has been driven into the mountain 61 feet, a fair showing of mineral obtained.

Shipments of smelter ore and concentrates for March from Gilpin county were 5561 tons, a small increase over February.

The Randolph 50-stamp mill at Black Hawk treated four cars of ore which produced eighty-four ounces of gold. Manager Stockbridge says the ore was taken from a pillar left in former workings and was let out on tribute.

The Freedom, Central City, is producing smelting ore averaging $115 per ton, stamp mill ore running four and a half ounces gold per cord, and concentrates from $19 to $22 per ton. Regular shipments of both classes of ore are made.

The East Whiting, property of the Grand Central G. M. Co., Central City, Manager McMasters, is being developed in a fine shoot of ore. Forty tons shipped to the Rocky Mountain mill at Black Hawk produced over $75 per cord.

A strike has been made at Black Hawk by the Gower Mines Syndicate, T. Dunstan, Supt. The find is in the seventh level, 500 feet down, west of the shaft.

A carload of ore from the P. K. mine, Black Hawk, gave values of 151 ounces silver, 5% lead and .10 ounce gold per ton.

The Patch M. Co., operating the California mine, have put in a new wire rope, replacing the one recently broken. Mr. McCann, the manager, anticipates unwatering the 2200-foot shaft by May 15.

The Oro M. & M. Co., Gilpin, have their tunnel on North Clear creek in 65 feet; H. R. McClelland is Supt.

The Two-Forty M. & M. Co. has incorporated, to operate in this county; offices in Central City and in Rock Island, Ill.

The Specie Payment mine, on Bellevue mountain, Gilpin, shipped forty cords in March to stamp mills at Black Hawk and some smelting ore to Idaho Springs samplers; E. W. Williams is manager.

HINSDALE COUNTY.

The Golden Fleece, near Lake City, is reported to be in pay ore in the lower tunnel 2400 feet in. A rich stringer cut at 2100 feet was followed 300 feet, opening into a 2-foot pay streak.

LAKE COUNTY.

The Elkhorn at Leadville has been started up by the Elkhorn M. Co. of London. Men are cleaning out the water down to the 340-foot level, drifts from which point will go north and west to prospect.

The Empire Co. at Leadville, H. Collins manager, have developed ore in a series of caves. One of them can be examined for 150 feet. All in the bottom are caked with iron ore and lime. Along the side walls some good veins of ore are found. The discoveries are at a depth of 250 feet. The shaft will be pushed 75 to 100 feet farther and extended under the caves.

Dewey & Robinson are unwatering the shaft of the Bug G. M. Co., at Leadville, preparing to sink deeper and to continue the drift from the bottom of the shaft. A large body of low-grade ore is cut by shaft and drift that can be profitably milled; the company intends to install a plant.

The output of the Iron-Silver M. Co., Leadville, for March was 8000 tons. Much of the ore is low-grade sulphide. The Stevens shaft is sinking for the lower sulphide ore zone.

The first shipment of the New Fryer Hill M. Co. has been made. The company, 200 feet south from Buckeye No. 1 shaft, encountered a large body of good grade iron, from which shipments have commenced. The iron has a vein of lead running through it, which increases the value.

LARIMER COUNTY.

J. Trescher and associates have bought a group of copper claims about 25 miles northwest of Fort Collins, which they propose to develop this season.

OURAY COUNTY.

The Newsboy M. & M. Co. has been in-

corporated to work the Newsboy group at Ouray. W. H. Allen is manager. The main tunnel is in 2200 feet. At present hand work is employed, but it is the intention of the company to install a compressor plant and to erect a 100-ton mill to treat the ore at the mine and thus save haulage costs on the low-grade ore.

H. H. Barbee and H. McMasters are reported to have bought a group of claims in Imogene Basin. The group is developed by several tunnels and shipments are being made.

The Ouray M. & M. Co. has bought the Fredonia claim, next the Camp Bird, for $20,000, and a tunnel will be run to open it at 2000 feet depth.

H. H. Barbee, H. McMasters and others of Colorado Springs have bought eighty-five acres near the Camp Bird, Ouray, for $100,000. The property is opened by a 3000-foot tunnel. The owners will extend this tunnel.

PARK COUNTY.

The Cincinnati G. P. M. Co., near Fairplay, are adding a second elevator to their plant.

The Platte Valley G. P. M. Co., Fairplay, is building a dredger, and will employ a drill in testing the ground and marking out a course for the dredger.

SAN JUAN COUNTY.

J. J. Yeckle, manager of the Sunlight M. Co., operating the Evening Star group, says that in running the lower tunnel they have 4 feet of rich ore, assaying from 60 to 100 ounces silver, $7 to $10 gold and 10% copper.

Chicago people have bought a group of twenty claims at Silverton, on which they propose to put a mill. The ore is said to run $16 a ton.

SAN MIGUEL COUNTY.

The Tom Boy, at Telluride, is credited with a recent shipment of $30,000 gold.

The Smuggler-Union, at Pandora, is reported to intend adding forty stamps and a gravity tram to their plant, to handle ore from the Contention group.

SUMMIT COUNTY.

The North American Gold Dredging Co., Breckenridge, has been reorganized and will operate two dredgers this summer. B. S. Revett is manager.——The Mecca Co. claim to have obtained $80,000 in six weeks' work last season with five men.——The Oro Grande Co. will work this season with two elevators.

TELLER COUNTY.

The Western G. M. Co., Cripple Creek, elected W. A. Otis, W. P. Sargeant, H. L. West, James A. Howze and W. H. Leffingwell directors. The capital stock was increased $350,000, to provide for the development of the Galena hill group.

A strike has been made on block No. 2 of the Vindicator, in a drift east of the shaft at a depth of 900 feet. The shoot contains a wide streak heavily charged with sylvanite. Assays from it are said to show $20,000 to the ton.

The Portland, Cripple Creek, has a contract with the railroad to ship 700 tons daily, three times the current output.

The Mobile G. M. Co., owning the Last Chance mine, Cripple Creek, will lease part of it to an Eastern syndicate starting operations in the district. Certain portions will be reserved to be worked by the company.

Work is being pushed on the Hull City placer of the Independence Con. Co., under lease to King & Whiting.

The Head lease for eighteen months yet on the Prince Albert, Cripple Creek, has been bought by R. H. Reid and W. P. Dunham of Denver for $6000. The new lessees expect to put in machinery to work a heavy tonnage.

The El Paso Con. G. M. Co. has bought the property of the Kimberly G. M. Co. at Cripple Creek for $240,000 in stock of the reorganized El Paso Co.

The Blue Bell Co., Cripple Creek, has leased 500 feet of the Blanche claim to J. Ryan & Co., who will commence active development work at once.

In a suit for commission on a mining sale that was never made the court has awarded the plaintiffs $200,000. The suit was brought by Benjamin F. Seymour against E. A. Colburn. The latter owns a controlling interest in the stock of the Gold King M. Co. of Cripple Creek. A contract was made last June, the complainant alleging, by which Colburn agreed to pay Seymour $200,000 if he found a purchaser who would pay $2,000,000 for the mine. H. H. Frambach was interested in the deal, but Colburn then refused to sell.

Lessee Osgood has put more miners on the Victor, Cripple Creek, to rush out the ore exposed before the lease runs out.——The Blue Bird shaft at Victor is down 800 feet.——W. S. Stratton, it is said, will sink a new shaft 1000 feet on the Matoa.

The Rio Grande sampler at Cripple Creek handled 8000 tons of ore, averaging $50, during March.

The Monarch M. & L. Co., leasing on the World's Fair of the Gold Bond Co., at Cripple Creek, are reported to have found a vein 2½ feet wide with a 4-inch streak, going $400 to the ton.

H. Tryer is sinking a 600-foot shaft on the Pharmacist, at Cripple Creek.

The Gold Dollar Co., at Cripple Creek, is making a crosscut at the 240-foot level to strike an ore shoot developed in the upper levels. The mine is producing thirty tons of ore daily.

The Modoc M. Co., at Cripple Creek, is to have a sinking plant on the Ocean Wave shaft identical with that on the Gold Coin, so Manager Frankenburg says. It is intended to mine the Last Dollar vein to a depth of 1000 feet. The present output of the mine is said to be 300 tons monthly.

J. E. Ridgway of Philadelphia has bought a half interest in the Hale & Holmes claim, adjoining the Golconda, for $13,500. Explorations indicate that the Golconda ore shoot extends into the Hale & Holmes claims.

Lessee Maynard of the 500-foot level, Moon Anchor, Cripple Creek, reports that the ore shoot was cut 20 feet above the level. The shoot is said to be better at the point where found than in the upper levels.

IDAHO.

ADA COUNTY.

The Rock Creek M. Co., Boise, W. McKinley, manager, have let a contract to sink a shaft on the I. X. L. mine on Rock creek.

HAILEY COUNTY.

A 5-foot ledge of good ore has been struck in the tunnel of the Idaho M. & M. Co. on the Jumbo group, near Hailey; so D. McKenzie, manager, says.

IDAHO COUNTY.

The Blue Jacket Co. proposes to develop several claims at Seven Devils and increase its output.

LEMHI COUNTY.

The Daisy group of nine claims, near Salmon City, has been bonded to R. Bell for Eastern people.

B. F. Ibach, Salmon, says that the tunnel on the Kittie Burton group is in 130 feet on a ledge of free milling quartz. He has a 3-stamp mill which he proposes to run all summer on ore from the mine.

NEZ PERCES COUNTY.

The Columbia G. M. & M. Co. of Lewiston has elected C. H. Harding president and D. Trullinger superintendent. They are working three claims in the Dixie district and claim to have uncovered a ledge of free milling ore 24 feet wide on the Columbia No. 1.

SHOSHONE COUNTY.

C. B. Wallace's tunnel on the Ruth at Wallace is in 110 feet, showing mineral the full length.

The suit of P. Bernier and associates against T. Anderson for a portion of the Sixteen to One claim, near Wardner, has been decided in favor of Bernier, who had located the conflicting Okanogan claim. Bernier says the ground is worth $250,000.

The Evolution M. Co., S. V. Osborne manager, has been organized to mine at Osborne.

The lead and silver output of the Cœur d'Alenes, Idaho, is to be restricted, with intent to sustain the market. The smelters have 50,000 tons of reserve, twice as much as ordinary. The reduction will amount to 25%.

MONTANA.

The 1900 (XI annual) report of the Bald Butte M. Co., B. H. Tatem, secretary and manager, states: Mine development during year: Shafts, tunnels, levels and crosscuts, 1937 feet; winzes, upraises, etc., 588 feet; cost, $18,806.72; average, $7.17 per foot, including grading and track laying. Extracted and trammed to mill, 26,439 tons of ore, cost $48,579.75, average $1.83¾ per ton mining cost. Mill operation: Forty stamps dropping for 324⅝ days, of 24 hours each, crushing 26,710 tons; average 82½ tons daily; cost $21,633.34; average nearly 81 cents. Average cost of milling itemized:

Labor	$ .53
Wood	.17
Supplies	.11

Comparative cost of milling in 10-stamp mill and 20-stamp mill in 1892:

	10 Stamps.	20 Stamps.
Labor	$2 43	$1 06½
Wood	76	28
Supplies	32	18½
Totals	$3 49	$1 53

The present cost with forty stamps shows less than 23¼% of cost with ten stamps, and less than 53% of cost with twenty stamps. The ore yielded bullion net value $288,289.88, average $10.79 per ton. In addition it yielded 298 tons of dry concentrates; net cash value, $20,466.16; average, $68.68 per ton of concentrates, or 76½ cents per ton of ore. Total net yield per ton of ore is $11.45½. Gross value of bullion and concentrates produced, $315,427.60; average, $11.81 per ton; average of all tailings assays, $2.0542. Net profit earned during the year, $195,049.22, being 78% on the capital stock. The cost of all equipment at mine and mill to January 1, 1901, amounts to $110,663.89. The amount expended for development work is $137,466.74, all paid from profits of working. At above date it amounted to 16,288 feet of mine openings of every description.

DALY COUNTY.

The Butte Land & Investment Co. have enjoined several lode claimants to prevent the working by them on the Butte & Boston placer mine at Butte. The latter is a patented claim and the lode claimants located subsequent to the issuance of the patent. The ground has become valuable through recent discoveries of high-grade copper ore close to the surface.

JEFFERSON COUNTY.

Smelter returns from six and one-half tons of ore from the Last Chance, A. M. Easterly owner, Radersburg, netted $1250. Considerable work is to be done this season.

LEWIS AND CLARKE COUNTY.

The Imperial Montana C. M., S. & W. Co. is incorporated in Arizona to operate nineteen mineral claims and water rights on the Blackfoot ceded strip; O. M. Holmes, agent, Helena.

London advices say that at a recent meeting of the Montana M. Co., owning the Drum Lummon, $200,000 were appropriated for the purchase of adjoining mining property.

The 90-foot extension of the shaft on the Sallie Bell mine at Rimini is completed and drifting begun. The drift has advanced 50 feet and is expected to cut the ore body at 125 feet.

The Argo G. & C. M. Co. have started work on their tunnel near Helena and expect to cut the shoot of the upper tunnel at 200 feet.

MADISON COUNTY.

E. L. Ballou, Supt. Garnet mine and mill at Pony, is preparing to start up the property. Several hundred tons of ore are ready for crushing. Last summer a shaft was sunk to 400 feet. Some fine ore was found and stoping will commence on this. The company intend to put in a pump and do considerable sinking this summer.

MEAGHER COUNTY.

Copperopolis has a population of 300 people and the mines are producing. The North Pacific is down 500 feet and rich ore is being hoisted. The Darling Fraction is 300 feet deep and the ore bodies are from 6 to 10 feet in width. Nearly $200,000 is said to have been taken out of these mines in 1900.

PARK COUNTY.

A. D. McNulty, manager of the Natural Bridge G. M. & M. Co., Livingston, says they are building a 15-stamp mill, which will be completed and operating within sixty days.

MICHIGAN.

HOUGHTON COUNTY.

The superintendent's report of the Franklin Copper M. Co. for 1900 shows the cost of mining and hoisting to be $1.16 per ton; cost of stamping, 30.34 cents per ton; average cost of drifting, $7.91; of crosscutting, $7.87 per foot.

NEVADA.

WASHOE COUNTY.

C. Bell, Reno, claims to have struck rich horn silver in his claim in Wedekind district.

WHITE PINE COUNTY.

Lain, Minoletti & Co. say they have made a strike of rich silver-bearing lead ore in the Ne Plus Ultra at Hamilton.

NEW MEXICO.

DONA ANA COUNTY.

The Torpedo mine, in the Organ mountains, east of Las Cruces, shipped twelve cars of ore in December, eleven in January and seven in February. The ores are copper and lead carbonates.

Las Cruces, April 6.

GRANT COUNTY.

The Silver City Reduction Works, E. Hanna manager, is remodeling and adding to its plant. The new matte furnace is now in blast.

SOCORRO COUNTY.

H. C. McCreery, of the Silver Bar Copper M. Co. at Cooney, states that the mine is opened to a depth of 500 feet, and is showing a large amount of ore.

OREGON.

BAKER COUNTY.

The Bonanza mine will put in five new concentrators right away. The Mammoth mine will put in twenty stamps.

Sumpter, April 4.

W. A. Settle and J. L. Baisley, Baker City, say they have found chrome iron deposits carrying large gold values in the Pleasant Valley district.

It is said the March cleanup of the Bonanza, at Sumpter, was $100,000.

Potter & Fryer, Sumpter, have a tunnel in 120 feet on a big ledge of free milling ore. They report good values.

The Aurora G. M. Co., G. W. McCoy, manager, are building a cyanide plant at Baker City and propose adding five stamps to their mill. Besides treating the ore from the Perry mine they intend doing custom work.

W. H. Remington and associates, it is reported, will erect a mill of large capacity on their properties at Sumpter.

The Oro Fino mine, near Alamo, is reported sold to Spokane people.

JOSEPHINE COUNTY.

The Klondike quartz mine, Grants Pass, has been bought by D. S. Rae of Montana, who will equip and operate the property. The Klondike is claimed to have ore 10 feet wide and milling $12 a ton.

Reports from Williams creek say a rich strike has been made at the Oregon Bonanza, at a depth of 200 feet, giving values of $70 to $80 per ton in gold and 7% to 10% copper.

LINN COUNTY.

At the annual meeting of the Calapoola & Blue River M. & M. Co., at Brownsville, the officers elected were: President, J. F. Venner; secretary, C. E. Stanard; superintendent, N. B. Standish. The company owns claims in the Blue River district and proposes to erect a 10-stamp mill this season.

SOUTH DAKOTA.

LAWRENCE COUNTY.

The Homestake Co. mill has 720 stamps, the Caledonia and Father DeSmet add 200 stamps, making 920 stamps, increasing the milling capacity of the combined plants of Lead, Terraville and Central to nearly 4000 tons daily. Two new companies, the Hidden Fortune and Crosby-Ehrich, are starting the development of adjoining properties.

UTAH.

JUAB COUNTY.

J. Knight, manager of the Anaconda at Tintic, says that 35 feet below the main tunnel level they have 2 feet of ore which yields 60% lead, 130 ounces silver and $4 in gold.

It is said that A. E. Snow of Salt Lake City, with Eastern associates, has control of the Pic Nic M. Co.'s holdings at Silver City, and that active development will begin in a short time. The property of the Pic Nic Co. adjoins that of the South Swansea and Silver Park.

PIUTE COUNTY.

The Copper Belt M. Co. has incorporated at Salt Lake City to work in Piute county. F. T. Talton is president, Max Krotki secretary and treasurer.

SALT LAKE COUNTY.

The Mystic Shrine Co. at Bingham have found 30 inches width of galena ore in the West Navajo tunnel. Manager Young says the ore will go as much as 38.6% lead, eleven ounces silver and $8.20 in gold.

A Salt Lake City syndicate is proposing to build a tramway from Bingham to the smelting plants. The shipments at the present time are over 1000 tons.

O. P. Posey, manager of the Bingham C. & G. M. Co. at Bingham, states that the options of that company on the Mammoth and Grand Central mines will be taken up and that preparations are being made for a monthly output from the combined properties of 25,000 tons. Two more furnaces and a converter are to be added to the plant to make the product copper bullion instead of matte.

The Old Bullion M. Co. has incorporated at Salt Lake City. James A. Brown is secretary. The company owns the Sandwich and Parrot and a lease on Bullion No. 3 mining claim, in Rush valley.

The Bingham C. & G. M. Co. have arranged to have their mattes reduced to bullion at the converter of the Highland Boy M. Co., pending the completion of their own converter plant.

The Tintic M. & D. Co. have bought the Yampa group at Bingham, paying $180,000.——Supt. Guenther reports that the Yankee Con. G. M. Co. at Eureka has struck ore 90 feet above the tunnel.

SANPETE COUNTY.

The Viking M. Co. has incorporated at Salt Lake City, W. T. Gunter secretary and treasurer.

UTAH COUNTY.

At the annual meeting of the Gold Hill M. Co., Provo, the directors organized as

follows: President, J. M. Brown; vice-president, R. R. Irvine; superintendent, F. M. Millett. The company owns properties at Stateline, on which work will be vigorously pushed this season.

WASHINGTON.

FERRY COUNTY.

The Wauconda ledge has been cut in the tunnel, 575 feet in; and 10 feet of ore averaging $15 per ton is claimed.

The Manila, at Keller, is to prospect with a diamond drill. The drift from the lower tunnel in 70 feet shows 20 feet of ore.

The Congress M. Co. are working several nickel-bearing claims on the south half of the Colville. They are running tunnel No. 4 to get 300 feet depth on the lode, and propose to get a treatment plant to handle the ore at the mine. L. H. Hopkins, Spokane, is secretary and F. Hines superintendent.

KING COUNTY.

The Renton coal mines, near Seattle, have been bought by the Seattle Electric Co. for $134,000.

STEVENS COUNTY.

Three feet of chalcopyrite ore has been uncovered at the Grace claim, at Chewelah.

FOREIGN.

BRITISH COLUMBIA.

The Red Line group, in Windemere district, have been sold to New York people, who will open them up; T. Starbird, Fort Steele, is manager.

The poor transportation is stated by the management to be delaying construction of the 10-stamp mill at the May & Jennie group, near Nelson, under bonds to the United Gold Fields, a French company; J. J. Fleutot, manager.

J. DeLamar has bought for a French syndicate Boulder creek claims at Atlin, and will increase the present hydraulic plant.

The B. C. Ex. Syndicate has made another payment on the Iron Mask, at Kamloops. Under the management of Capt. Argall, development work is being done, the main shaft being down 200 feet.

Two ledges—one concentrating ore, the other solid galena—have been found on the Aurora mine, across Moyie Lake. It is thought the St. Eugene lead extends across the lake and into the Aurora. The strike is regarded as important.

W. W. Warner, M. E., has leased the Wonderful, in Sandon camp, and will develop it.

The Waterloo, at Camp McKinney, has started up its 5-stamp mill.

S. F. Griswold reports that the shaft of the Norway Mountain M. Co., on Norway mountain, Rossland, is down 60 feet. There is ore in the shaft that carries gold, silver, copper and lead.

Pine and Spruce creek placers at Atlin include ancient pre-glacial river beds and rich glacial morraines reconcentrated into existing stream beds. The latter are formed from the glacial erosion of the old stream beds higher up stream. In drift diggings an average of $6 a cubic yard is obtained.——The Sunrise Hydraulic Co., Atlin, J. M. Ruffner manager, will enlarge their ditches, add pipe lines and generally develop the Sunrise group, preparatory to hydraulicking next season.

W. Planta, Nanaimo, is reported to have discovered a free milling gold quartz vein on Texada island, near Texada lake.

The White Mountain M. Co. has incorporated, capital $100,000, to mine White Mountain mineral claims in Brown's camp, in the Grand Forks division of Yale district.

It is reported that work will be resumed by the Cottonwood Alluvial G. M. Co. on Long Bar, at Quesnelle.

McVicar & Lake have eight men on the Bondholder, at Slocan. A stope is being run to surface from main drift. Ore is being sorted and sacked daily.

The Silver Crown Con. M. Co. is resuming work on the Shiloh at Ymir. Tenders are asked for driving the tunnel heading 100 feet farther.

The force at work on the Foghorn mine at Ymir is to be increased and three shifts started sinking on main ore shoot.

The Canadian Gold Fields Co. believe they have made a strike on the True Blue group on Kelso creek, near Nelson. The crosscut broke into ore going 12% copper.

The LeRoi, War Eagle and Center Star at Rossland are considering the bringing in of water and the erection of two large concentrators. It is estimated that $150,000 will have to be expended on the water line and more on the concentrators. It is claimed that with the concentrators $4 ore can be made profitable, three to ten tons being concentrated into one at a cost of 60 cents per ton.——In the Green Mountain the diamond drill at a depth of 165 feet has cut a 20-foot ledge carrying ore of a pay grade. A shaft is to be sunk to it. ——The Rossland output for the last week in March was 8478 tons, and the total for the quarter is 95,559 tons. It is claimed the concentrator plant proposed would double this rate of output.

The Fisher Maiden, Slocan, has been bonded by the Bank of Montreal to a Spokane syndicate; J. K. Clark, manager. Work is to be commenced upon the property at once.

The Condor group, Slocan, a silver-lead proposition, bought by W. H. Sandiford for an English syndicate, will be developed this season.

The Imperial Dev. Syn., a Nelson corporation, announces the second payment on the Eva group, in the Lardo country.

DUTCH GUIANA.

J. Keegan, a former resident of Telluride, Colo., has been engaged in mining in Dutch Guiana, South America, for several years. He gives much interesting information regarding the industry as followed there. The country is not overrun with people, and vast opportunities await the energetic American who can obtain a concession, and with modern appliances engage in the mining business. There are now comparatively few Americans, and most of those who have been there some time have secured possession of valuable mineral land and are doing well. The mining field is mostly placer ground, though some promising leads have been uncovered. Placer ground is the more available, the country being comparatively flat, and along the creek bottoms and river beds fine streaks of rich gold-bearing sand are frequently found, from which, with crude processes, excellent profits are being earned by individuals and companies. Within a year or two operators have been reaching out for improved American mining machinery, and one or two modern plants were being installed. One trouble experienced in mining is in securing labor, as the natives abhor work, and the few induced to will do so no longer than is necessary to earn $1.25, which amount seems to represent the summit of their desires. And it is with difficulty that an American can acclimate himself, for with fevers and tropical heat, the system is reduced. The average American can get along in the country, as nearly everyone speaks English.

MEXICO.

At Tepic the Zopilote M. Co. is working the Zopilote, Frazada, Javalina and Restauradora mines. The net yield in 1900 was $119,331.84, Mexican—the Restauradora mine $9256.69, Mexican. The manager says there are thirty stamps in operation. The lixiviation process operates successfully.

At Ixtlan del Rio the Castellana M. Co. say an English company will buy the property and increase considerably the development.

Tepic, March 26.

The Guadelupe and Fortuna mines, La Cumbre, Guadelupe y Calvo, State of Chihuahua, have been sold to New York men, upon a report made by W. H. Weed, Butte, Montana. The vein is said to average 10 feet of pay ore, free gold and pyrites.

The British G. M. Co. have erected a smelter at La Colorada, Sonora, having a capacity of 600 tons. A. L. Waters is manager.

Cameron, Currie & Co. of Detroit, Mich., have bought the Garcia mines in Oaxaca, and propose putting a large machinery plant on them.

SOUTH AFRICA.

Sinking and crushing have started in the Simmer & Jack, Jubilee, City & Suburban and Salisbury properties, on the Rand.

SOUTH AMERICA.

Colon reports 200 bars of gold are on the way north from the interior of Colombia. Nearly $1,000,000 left Colon on the 24th for Europe on the Para for Southampton.

SPAIN.

The Rio Tinto copper mines during 1900 yielded 1,894,504 tons of pyrites, compared with 1,649,844 tons in 1899. The average of copper content was 2.774%, as compared with 2.719%. Copper produced, 35,732 tons.

PERU.

A Government engineer, measuring a rubber concession in the lower part of the San Gabanes river, in Carabaya, has discovered placer gold.

Trade Treatises.

General Catalogue No. 22 of the Smith-Vaille Co. sumptuously sets forth the latest as produced by them in all departments of pumping machinery, handsomely illustrated and full of detailed information on that entire subject. A copy of this fine publication will be sent upon request. Issued by the Stilwell-Bierce & Smith-Vaille Co., Dayton, Ohio.

Personal.

JNO. FILIUS has returned from Boston to Redding, Cal.

W. C. RALSTON will be in New York City till June 1st.

J. B. STEVEN is in Grass Valley, Cal., examining mines.

R. G. LEGG is now Supt. Shawmut mine, Bingham, Utah.

PHILLIP DEIDESHEIMER is examining copper mines in Mexico.

H. E. LIGHTNER of Amador county, Cal., is in San Francisco.

I. MAY has been appointed Supt. Triumph mine, Victor, Colo.

WM. FITZMAURICE is with the Trinity Copper Co. at Copley, Cal.

E. A. WILTSEE is at Eureka, Utah, examining mines at that place.

L. F. WARNER, mining engineer of Auburn, Cal., is in San Francisco.

A. M. GAINES has been appointed manager Rialto M. Co., Leadville, Colo.

PROF. N. H. WINCHELL, State Geologist of Minnesota, is in Helena, Mont.

H. L. JOHNSTON has been appointed Supt. Oriental mine at Alleghany, Cal.

H. M. CHANCE, M. E., of Philadelphia, Pa., has returned home from Globe, Ariz.

C. W. PURRINGTON of Boston, Mass., is examining mines in Siskiyou county, Cal.

A. GRAVES, M. E., of Denver, Colo., is in Arizona examining mines near Prescott.

H. D. LANE of Cripple Creek, Colo., is Supt. White Hills mines, near Kingman, Ariz.

C. A. HOLLAND, Supt. Providence mine, Tuolumne Co., Cal., is in San Francisco.

JOHN OWEN, manager of the John Owen M. & M. Co. of Colorado, has resigned.

CAPT. H. H. TODD of Alameda, Cal., is now resident manager New York Exploration Co.

J. P. EVANS of the Colorado Iron Works returns from Detroit, Mich., to Denver next week.

J. E. SPURR of the U. S. Geological Survey has gone to Turkey to examine mines for the Sultan.

T. E. SCHWARTZ, manager Iron-Silver M. Co., Leadville, Colo., has returned there from New York.

W. W. ADAMS of Butte, Mont., is at Redding, Cal., in charge of the works of the Trinity Copper Co.

P. B. ETESON, Supt. Kia Oro gold dredger, Oroville, Cal., returns there from San Francisco this week.

P. J. DONAHUE, who has been examining mines at Eureka, Nev., has returned to Salt Lake City, Utah.

B. J. LOTT of Helena, Mont., has been appointed manager Blackfoot Copper Co., operating near that place.

W. H. SULLIVAN, representing the Mine and Smelter Supply Co. of Denver, Colo., has returned from Arizona.

L. VON ROSENBERG, who has been examining the Vulture mine, at Wickenburg, Ariz., has returned to New York.

A. C. SIEBOTH of Denver, Colo., and G. A. Loudbery of Milwaukee, Wis., are examining mines near Globe, Ariz.

T. C. CASSIDY of Kalgoorlie and L. N. Walford of Sydney, Australia, mining engineers, are at Cripple Creek, Colo.

THOS. J. BARBOUR of the Risdon Iron Works, San Francisco, returns to San Francisco from Nova Scotia next week.

A. M. JAINES, manager Home Ex. M. Co., Leadville, Colo., is to have the same position with the Rio Alto M. Co., at the same place.

FRANK W. GRIFFIN, representing the Bucyrus Co., has returned from South Milwaukee, Wis., to San Francisco. His office is 507, Safe Deposit building.

Obituary.

MR. WM. H. BIRCH, prominent for many years in the manufacture of mining machinery, died at his residence at Haywards, Cal., on the 9th inst. Deceased was a native of Boston, Mass., in the 70th year of his age, and during the course of a long and useful life did much for the State of his adoption.

RICHARD C. CHAMBERS, a well-known California and Utah miner, died in San Francisco on the 11th inst., in the 65th year of his age. For forty-five years he was a prominent figure in Western mining interests, and at the time of his death was superintendent and part owner of the Ontario, Utah, mine.

JNO. F. KIDDER, California State Debris Commissioner, and a foremost citizen of Nevada county, Cal., died at Grass Valley, Cal., on the 10th inst. He was born in New York City in 1830, and for fifty years was prominent in railway affairs. He was for twenty-five years the leader in the maintenance of the Nevada County Narrow Gauge Ry. Co., and did much for the development of the mining industry of Nevada county.

Recently Declared Mining Dividends.

	Payable.
Empire State-Idaho M. & D. Co., Idaho, 1%	April 15
Parrot M. Co., Montana, $1.50 per share	April 29
Amalgamated Copper Co., regular $1.50 per share, extra 50 cents per share, $1,500,000	April 29
Daly-West, Utah, regular monthly 30 cents per share, $45,000	April 15
Mary McKinney, Colo., regular quarterly 3 cents per share, $30,000	April 10
Montana Ore Purchasing Co., $1 per share, extra $2 per share	April 27
Central Eureka M. Co., Cal., No. 2, $10,000	April 5
Canadian G. F. Syndicate, Ltd., British Columbia, No. 2, 3%	April 22
Portland, Colorado, regular quarterly 6 cents per share	April 15
Parrot S. & C. Co., regular quarterly $1.50 per share	April 29
Creede & Cripple Creek M. & M. Co., Colorado, 2 cents per share, $16,000	May 1
Anaconda, Montana, regular $1.25 per share, extra 75 cents per share, $2,400,000	April 26

Commercial Paragraphs.

C. M. HAMPSON, Denver, Colo., recently installed four Bartlett tables in the mill of the California & Colorado Shareholding Co., Idaho Springs, and two of the same make in the Cold Springs mill at Rowena, Boulder county, Colorado. The Bartlett tables are manufactured by the Colorado Iron Works.

THE Pacific Iron Works of McKittrick, Cal., has a new 800-pound American steam hammer from John Wigmore & Sons Co., Los Angeles, Cal. John Wigmore & Sons Co. have also sold a heavy lathe to the Valley Machine Shop of Fresno, Cal., and another to the Hanford, Cal., Agricultural Works.

List of U. S. Patents for Pacific Coast Inventors.

REPORTED BY DEWEY, STRONG & CO., PIONEER PATENT SOLICITORS FOR PACIFIC COAST.

FOR WEEK ENDING APRIL 2, 1901.

671,043.—GRAIN SEPARATOR—D. Best, San Leandro, Cal.
671,044.—AIR COMPRESSOR—G. S. Binckley, S. F.
671,178.—FRUIT CAR—Bollinger & Dragoo, Reedley, Cal.
671,366.—PIPE COUPLING—G. M. Brodie, Angels, Cal.
671,078.—DISTILLATION—J. T. Davis, S. F.
671,209.—AIR PUMP—R. W. Elliott, Oakley, Cal.
671,047.—HAIR BRUSH—H. H. Fox, Spokane, Wash.
671,164.—BRAKE—E. M. Fraser, S. F.
671,081.—GELATINE DYNAMITE—E. E. Green, Santa Clara, Cal.
671,068.—BED BOTTOM—Jno. Hoey, S. F.
671,051.—SPECTACLES—W. C. Jones, S. F.
671,085.—HARVESTER SICKLE—P. W. Knowles, Dufur, Or.
671,024.—MOWER—V. J. Long, Sprague, Wash.
671,112.—VEHICLE AXLE—P. B. Mathiason, Los Angeles, Cal.
671,421.—FISH DRESSING MACHINE—G. Merkle, S. F.
671,088.—PROPELLER—J. S. Morton, Oakland, Cal.
671,089.—PROPELLER—J. S. Morton, Oakland, Cal.
671,090.—PUMP—J. S. Morton, Oakland, Cal.
671,222.—TRUCK—J. J. Moule, Stockton, Cal.
671,027.—ROLLER CHAIR—A. J. Petter, S. F.
671,028.—PULP AGITATOR—J. R. Phillips, Stockton, Cal.
671,388.—PROTECTING SAFES—A. P. Prichard, Tacoma, Wash.
671,298.—GARMENT FASTENER—W. T. Schmidt, Blanco, Cal.
671,095.—RICE PREPARATION—M. Shiino, S. F.
671,073.—MECHANICAL STOKER—W. H. Smyth, Berkeley, Cal.
671,096.—BASIN MAKER—C. J. Stoneham, Sierra Madre, Cal.
671,074.—HITCH BLOCK—M. C. White, Los Angeles, Cal.
671,075.—PHOTO PRINT WASHER—T. White, Vallejo, Cal.
34,317.—DESIGN—A. Heunisch, S. F.

Notices of Recent Patents.

Among the patents recently obtained through Dewey, Strong & Co.'s SCIENTIFIC PRESS U. S. and Foreign Patent Agency, the following are worthy of special mention:

HAIR AND SCALP BRUSH.—No. 671,047. April 2, 1901. H. H. Fox, Spokane, Wash.

This invention relates to a brush designed as a means for applying a tonic or shampoo liquid to the scalp and the hair, and consists of a rubber bulb carried upon the handle and holder, teeth projecting upon the opposite side having connection with the interior of the bulb whereby a liquid contained therein may be applied to the scalp, and proper friction maintained on the same.

BED BOTTOM ATTACHMENT.—No. 671,068. April 3, 1901. John Hoey, San Francisco, Cal.

The object of this invention is to provide a finish for the ends of the transverse frames of bed bottoms, to provide a means for supporting the bottom from the side rails of the bedstead so as to hold the wire bottom at the proper elevation, at the same time to allow the side rails of its frame to hang unsupported inside the bedstead rails. It also provides a means for stiffening and retaining the top mattress in place, and for securing the spiral springs beneath the woven wire bottom, so that they will remain in an upright position and not slip out of place.

PULP AGITATOR.—No. 671,028. April 3, 1901. John R. Phillips, San Francisco, Cal.

This invention is designed for use in the working of pulp or tailings containing metals or the like. It consists of an inclined funnel-shaped tank, a circulating or suction and force pump, a pipe extending centrally down to near the bottom of the cone with a discharge nozzle through which the liquid is delivered when forced so as to flow upward along the sides of the funnel and through the material whereby the latter is lessened, agitated and prevented from packing. A filter lining may be used for the funnel providing a space intermediate between it and the sides of the funnel for the filtering through of water, and a means for conducting such filtered water away from the apparatus.

GRAIN SEPARATOR AND CLEANER.—No. 671,043. April 3, 1901. Daniel Best, San Leandro, Cal.

This invention relates to an apparatus for separating grain from chaff and foul material with which it may be associated after threshing, and for cleaning it. It consists in the combination with a threshing cylinder, inclined grain carrier, and separate straw carrier of a stationary horizontally disposed screen located below, an endless traveling belt with transverse slats moving over the upper surface of the screen, and fans located beneath and discharging an air blast upwardly and rearwardly through the screen.

Latest Market Reports.

SAN FRANCISCO, April 11, 1901.

SILVER—Per oz., Troy: London, 26 1/16d (standard ounce, 925 fine); New York, bar silver, 59⅛c (1000 fine); San Francisco, 59¼c; Mexican dollars, 49¾c San Francisco, 48c New York.

The establishment of a mint in Manila, P. I., as at present contemplated by the United States Government, would aid in keeping up the price of silver. This subject is treated at some length editorially on page 176.

COPPER.—New York: Lake, 1 to 3 casks, $17.25; carload lots, $17.00; Electrolytic, 1 to 3 casks, $16.75; carload lots, $16.50; Casting, 1 to 3 casks, $16.75; carload lots, 16.62½. San Francisco: 18. Mill copper plates, 20c; bars, 22@23c. London: £68 12s 6d per ton.

LEAD.—New York, $4.37½; Salt Lake City, $4.00; St. Louis, $4.27½; San Francisco $5.00, carload lots; 5½c 1000 to 4000 lbs.; pipe 6¾, sheet 7½, bar 6c; pig, $4.70 @5.10. London, £12 6s per ton=2.75 cents per ℔.

Denver this week reports that the manager of the smelter trust there announces that the selling price for lead has been reduced from $4 to $3.90, and mine operators look for a still further reduction. The $4 rate has been in effect now over a year. The mine owners entered into an agreement with the trust to accept the $4 rate regardless of the market price of lead, which at that time was above $4. The agreement expired January 1st, and the trust now asserts that, on account of overproduction, it is unable to maintain the $4 rate.

SPELTER. — New York, $4.20; St. Louis, $3.75; London, £16 10s per ton =3.58¼ cts. per ℔; San Francisco, ton lots, 5½c; 100-lb lots, 6c.

ANTIMONY.—New York, Cookson's, 10c; Hallett's, 9c; San Francisco, 1000-lb lots, 12c; 300 to 500 lbs., 13@14c; 100-lb lots, 15@18c.

IRON.—Pittsburg, Bessemer pig, $17.25; gray forge, $16.50; San Francisco, bar, per lb., 2.65c in small quantities.

STEEL.—Bessemer billets, Pittsburg, $24; open hearth billets, $27.00; San Francisco, bar, 7c to 12c per lb.

TIN.—New York, pig, $26.00; San Francisco, ton lots, 29c; 1000 lbs., 29½c; 500 lbs., 29½c; less, 30c; bar tin, ℔ lb, 35c.

QUICKSILVER. — New York, $51.00 large lots; London, £9 2s 6d; San Francisco, local, $47.50 ℔ flask of 76½ lbs.; Export, $45.00

MAGNESIUM.—New York, $2.90 ℔ lb.; San Francisco, $3.75.

ZINC.—San Francisco, 5½c; slab, 5¾c; bar, 7c; zinc dust, N. Y., 8c.

BABBITT METAL.— San Francisco, No. 1, 10c.

SOLDER. — Half-and-half, 100-lb. lots, 18½c; San Francisco, Plumbers', 100-lb. lots, 15½c.

ASSAY LITHARGE.—San Francisco, 10c ℔ lb, small lots.

BISMUTH.—New York, ℔ lb., $2.25 50-lb lots; San Francisco, $2.50 to $2.75 ℔ lots.

PLATINUM.—San Francisco, crude, $18 ℔ oz.; New York, $18.20 per Troy oz

ALUMINUM.—New York, No. 1, 99% pure ingots, 35c; No. 2, 90%, 30c to 35c.

FERRO-MANGANESE. — Pittsburg, 80%, domestic, $62.50, large lots.

TUNGSTEN.—New York, ℔ lb., 95c; San Francisco, $1.15.

FERRO-TUNGSTEN. — New York, 37%, 32c; San Francisco, 65c (60%).

NICKEL.—New York, 50@60c ℔ lb.

PHOSPHORUS. — F. o. b. New York 50@60c ℔ lb.

POWDER.—F. o. b. San Francisco: No. 1. 70% nitro-glycerine, per lb., in carload lots, 15½c; less than one ton, 17½c. No. 1*, 60%, carload lots, 13½c; less than one ton, 15½c. No. 1** 50%, carload lots, 11¾c; less than one ton, 13¾c. No. 2, 40%, carload lots, 10c; less than one ton, 12c. No. 2* 35%, carload lots, 9½c; less than one ton, 11½c. No. 2** 30% carload lots, 9c; less than one ton, 11c. Black blasting powder in carload lots, minimum car 728 kegs, $1.50 per keg; less car lots, $2 per keg.

CAPS.—3x, $5.50 per 1000; 4x, $6.50; 5x, $8; Lion, $9, in lots not less than 1000.

FUSE.—Triple tape, $3.60 per 1000 feet; double tape, $3.00; single tape, $2.65; Hemp, $2.10; Cement No. 2, $3.00; Cement No. 1, $2.65, in lots of 3000 feet and up.

CANDLES.—Granite 6s, 16 oz., 40s., 10½c ℔ set; 14 oz., 40s., 9¾c.

CHEMICALS.—Cyanide of potassium, 98%-99%, jobbing, 32½@33½c ℔ lb.; carloads, 30@31c; in 10-lb. tins, 40c; sulphuric acid, in carboys, 66° B, 2c ℔ lb.; soda ash, $1.90 ℔ 100 lbs. 58%; hyposulphite of soda, 2¾@3c ℔ lb.; blue vitriol, 5¾@6½c ℔ lb.; borax, concentrated, 7@8c ℔ lb.; chlorate of potash, 12@13c; roll sulphur, 6c; alum, $1.90@2.00; flour sulphur, French, 2¼@2½c; California refined, 1¾ @ 2c; nitric acid, in carboys, 8c ℔ lb.; caustic soda, in drums, 3@4c ℔ lb.; Cal. s. soda, bbls., $1.00; sks, 95c ℔ 100 lbs.; chloride of lime, spot, $2.50@2.60; nitrate of potash, in kegs, 8c; caustic potash, 10c in 40-lb. tins.

OILS.—Linseed, pure, boiled, bbl., 75c; cs., 80c; raw, bbl., 73c; cs., 78c. Deodorized Stove Gasoline, bulk, 14½c; do., cs., 20½c; 86° Gasoline, bulk, 20c; do., cs., 26c; 63° Naphtha or Benzine, deodorized, in bulk, per gal., 13½c; do., in cs., 19½c; Lard Oil, Extra Winter Strained, bbl., 75c; cs., 80c; No. 1 bbl., 50c; cs., 55c. Neatsfoot Oil, coopers' bbls., 60c; cs., 65c; No. 1 bbl., 50@52½c; cs., 55@57½c.

COAL. — San Francisco, coast, yard prices: Wellington, $9; Seattle, $7.00; Coos Bay, $5.50; Southfield, $9.00. Cargo lots, Eastern and foreign: Wallsend, $8.00; Brymbo, $7.50; Pennsylvania, hd., $14.00; Scotch, $8; Cumberland, $12; Cannel, $9.50; Welsh Anthracite, $12.00; Rock Springs, $8.50; Colorado Anthracite, $14.50. Coke, $16 per ton in bulk; $18 in sacks.

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Wanted—Rand Drill Man.

Must be capable of running compressor. State experience and wages required. One acquainted with Mexico and language preferred. Address DRILL, care of Mining and Scientific Press.

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THE CALIFORNIA DEBRIS COMMISSION, HAVING received applications to mine by the hydraulic process from F. C. LeBlond and W. E. Olmstead, in the Chaparral Hill Mine, near Downieville, Sierra Co., to deposit tailings in Goodyear Creek; from Ah Lung, in the Fuller Flat Mine, near Scales, Sierra Co., to deposit tailings in Canyon Creek; from J. H. Skinner, in the Lava Point Mine, at Hepsidam, Sierra Co., to deposit tailings in Whiskey Creek; from J. W. Dempsey, in the Hungarian Hill Mine, near Quincy, Plumas Co., to deposit tailings in Whiskey Creek; and from J. S. Carter and Wm. Deal, in the Cadmus mine, at head of Peters Creek, Plumas Co., to deposit tailings in Peters Creek, gives notice that a meeting will be held at Room 59, Flood Building, San Francisco, Cal., on April 15 1901, at 1:30 P. M.

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With buckets having capacity of seven and a half cubic feet. Dredge only used few months. Located on Grasshopper creek, near Bannack, Mont. For full particulars, address THE BUCYRUS COMPANY, South Milwaukee, Wis.

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Strictly Modern.
Little Used.
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ANY PART OF THIS MILL WILL BE SOLD.

This 20-stamp mill is located at Ohio City, about 25 miles east of Gunnison, Colorado. We are dismantling this mill for shipment to Denver and will quote prices on any part of the mill f. o. b. cars Ohio City, Colorado, and guarantee to make prompt shipment. The construction of the mill was of the best, both in machinery and buildings. The total cost of machinery and buildings, which we have bought, was $130,000.00. Why was it sold? Simply another case of a mill without a mine. All correspondence should be addressed to our Denver office.

20 STAMPS. 850-lb. rapid drop, complete with frames.
2 BOILERS, 44 in. x 12 ft.; 30 3½ in. flues.
2 BOILERS, 44 in. x 12 ft; 34 3 in. flues.
(Boilers are set in batteries of two, half fronts, two stacks.)
CORLISS ENGINE, Fraser & Chalmers, 175 H. P.; cylinders 18x42 in.
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2 MEECH SYNDIACTORS, new.
2 MEECH AMALGAMATORS.
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REVOLVING ORE DRYER (F. & C.), 42 in. x 18 ft.
6 AUTOMATIC ORE FEEDERS.
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250 FT. SHAFTING, 4 7-16, 3 15-16, 2 15-16 dia.
1200 FT. RUBBER BELTING, 18, 16, 14, 12, 10, 6 and 4 in. widths.
4 CONVEYOR BELTS, with buckets attached.
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3000-LB. FAIRBANK DORMANT SCALE.
WOOD TANK, 8x8x3 FT.; IRON TANK, 6x6 FT.
1000 IRON PIPE FITTINGS AND VALVES.
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Special Meeting.

OXFORD BETA TUNNEL AND MINING Company.—There will be a special meeting of the stockholders of the Oxford Beta Tunnel & Mining Company, to be held at the office of the company, No. 135 Geary St., Room 111, San Francisco, at the hour of 4 o'clock P. M., on the 4th day of June, 1901, for the purpose of increasing the capital stock of the company from twenty-nine hundred shares of the value of one hundred dollars each to one hundred thousand shares of the value of two dollars and fifty cents each. By order of the Board of Trustees. W. H. KNIGHT, Secretary.

Annual Meeting.

The Regular Annual Meeting of the Stockholders of the Gwin Mine Development Company will be held at the office of the Company, Nos. 1208-11 Claus Spreckels Building, San Francisco, California, on TUESDAY, the 23d day of April, 1901, at the hour of 2 o'clock P. M., for the purpose of electing a Board of Directors to serve for the ensuing year, and the transaction of such other business as may come before the Meeting. Transfer Books will close on SATURDAY, the 20th day of April, 1901, at 12 o'clock noon. J. J. CRAWFORD, Secretary.

Office—No. 1209 Claus Spreckels Building, San Francisco California.

Published Notice of Decrease of Stock.

Notice is hereby given, that a general meeting of the stockholders of the Alaska Juneau Gold Mining Company, a corporation created under the laws of the State of West Virginia, will be held at the office of the company, at No. 320 Sansome Street, in the City of San Francisco, California, on the 25th day of April, 1901, at 12 o'clock noon, for the purpose of reducing the capital stock of said company; at which meeting a resolution will be offered to reduce the authorized capital stock of said company from 500,000 shares of the par value of $10 each to 500 000 shares of the par value of 10 cents each. By order of the President.

R. M. MEIN, Secretary.

Published Notice of Decrease of Stock.

Notice is hereby given, that a general meeting of the stockholders of the Union Hill Consolidated Mines, a corporation created under the laws of the State of West Virginia, will be held at the office of the company, at No. 320 Sansome Street, in the City of San Francisco, California, on the 25th day of April, 1901, at 11 o'clock A. M., for the purpose of reducing the capital stock of said company; at which meeting a resolution will be offered to reduce the authorized capital stock of said company from 400,000 shares of the par value of $1 each to 400,000 shares of the par value of 10 cents each. By order of the President.

JOSEPH H. MOOSER, Secretary.

C. M. HAMPSON, Mech. Eng'r.

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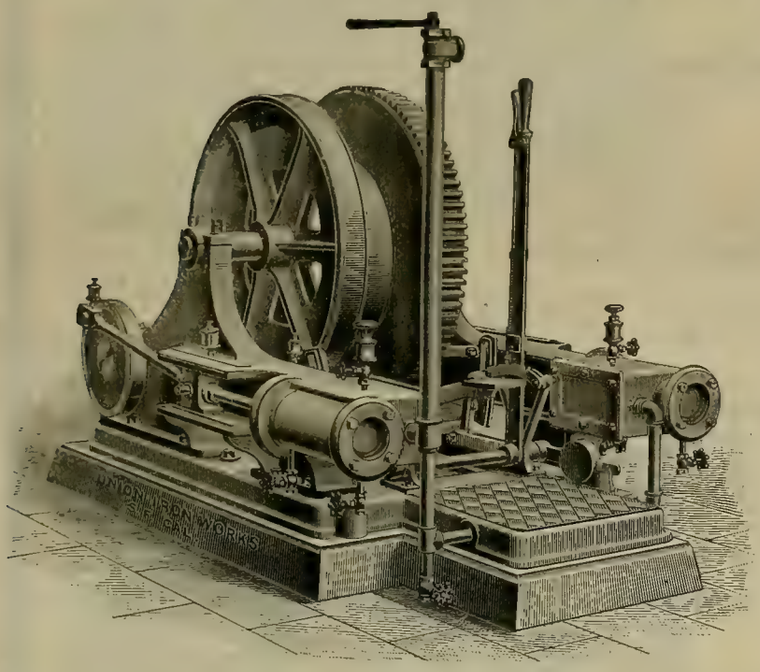

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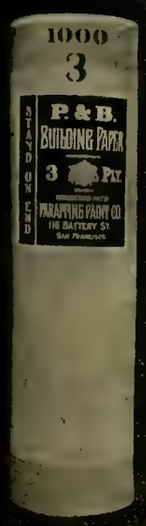

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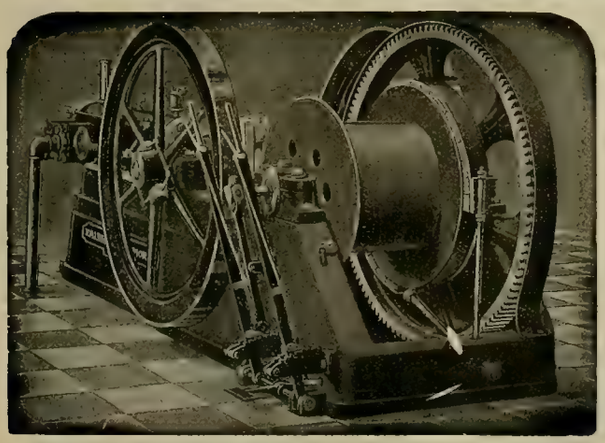

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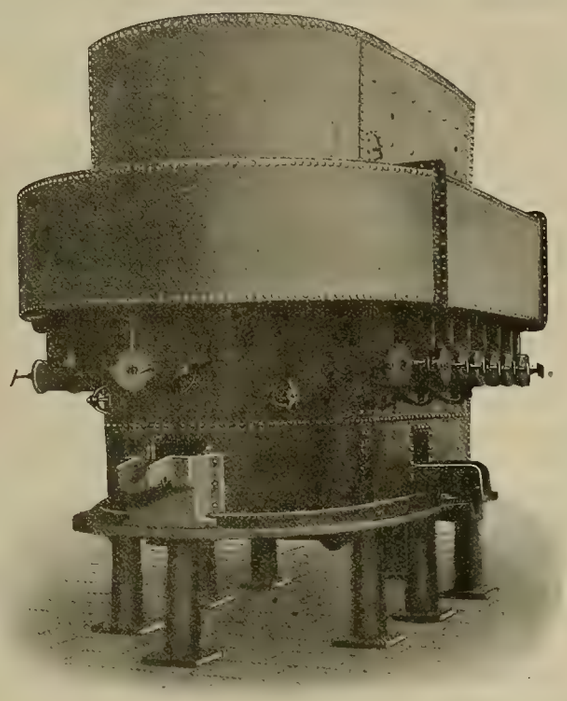

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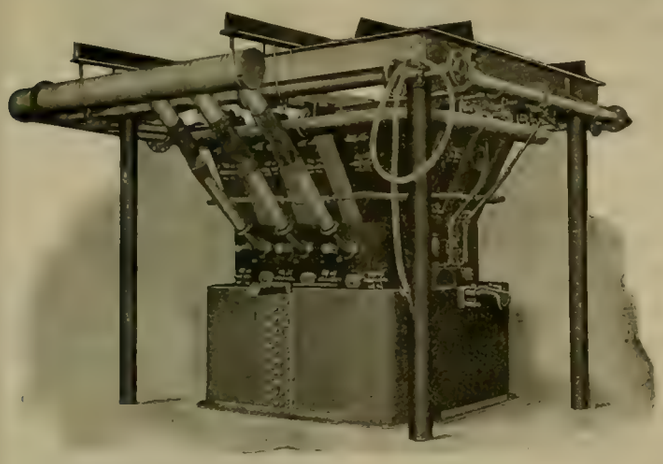

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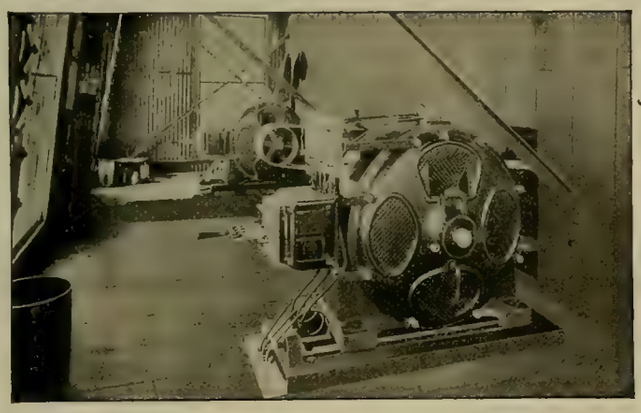

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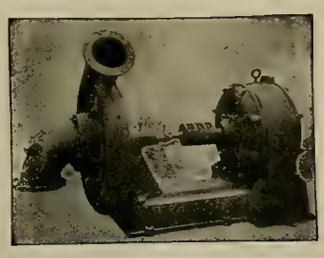

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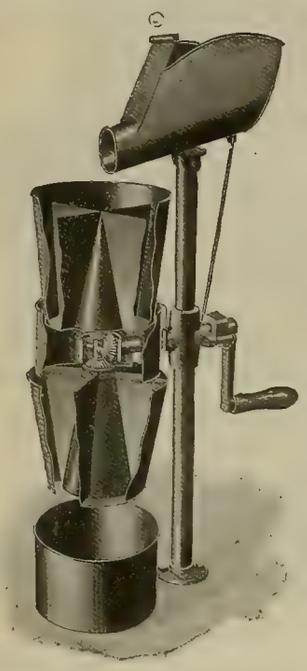

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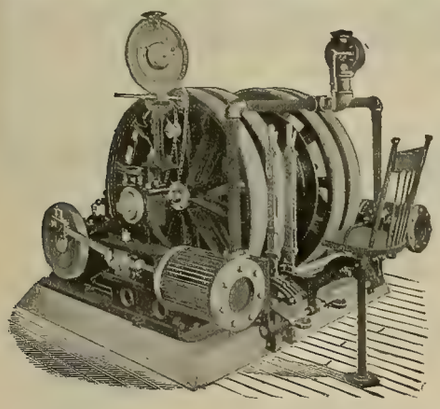

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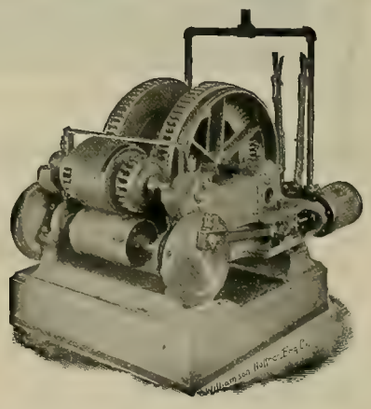

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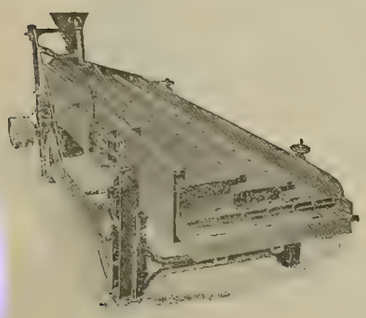

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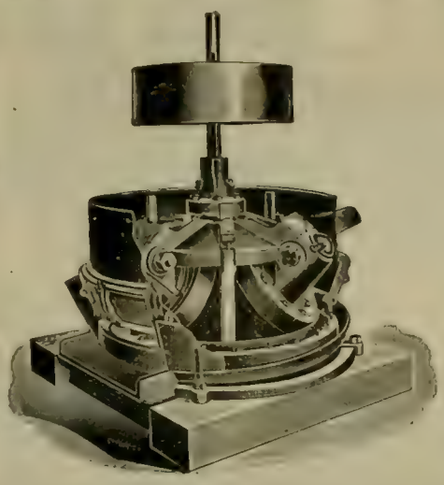

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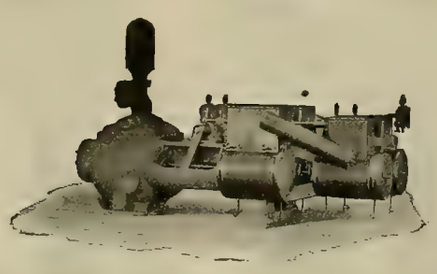

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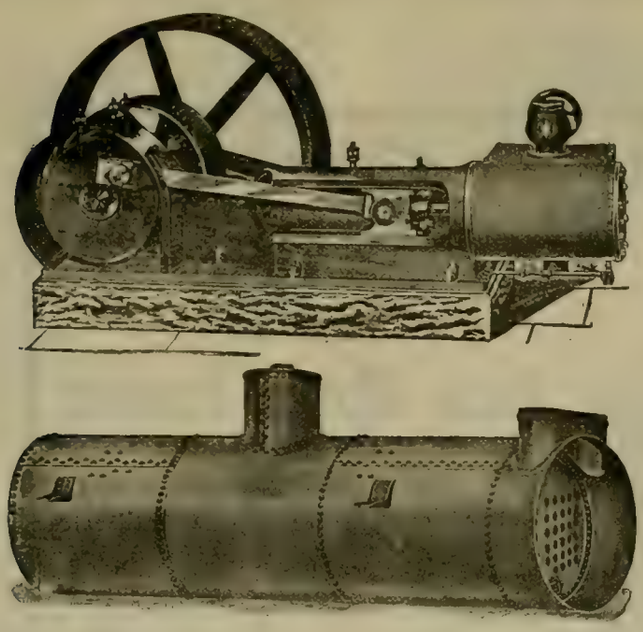

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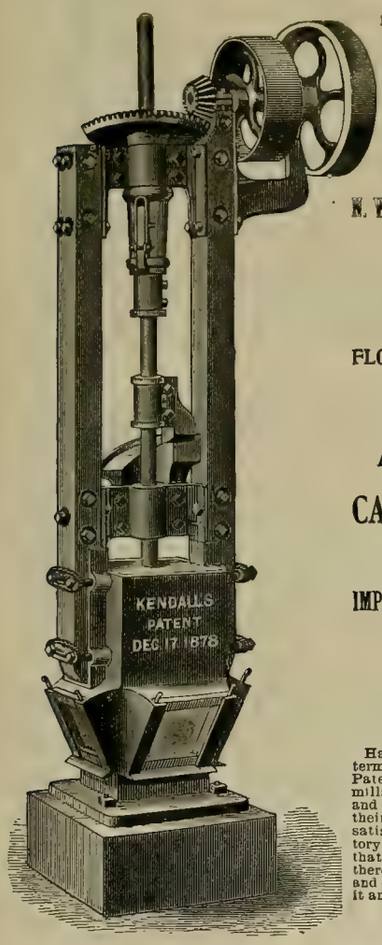

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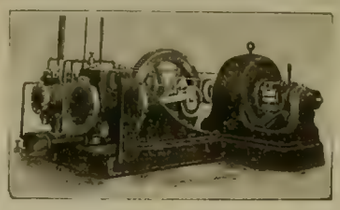

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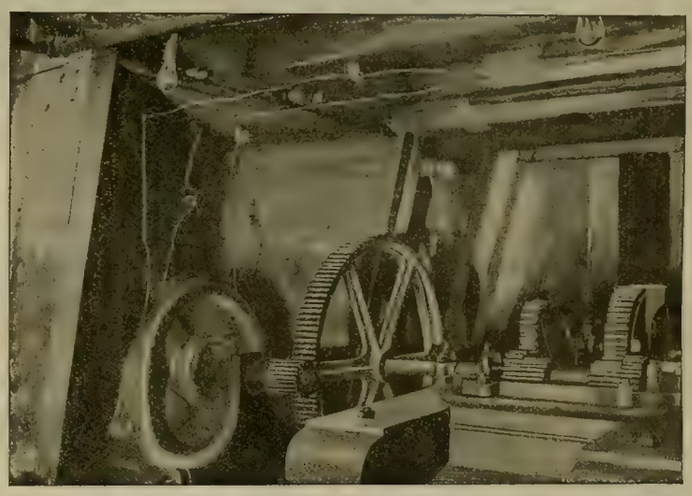

The above cut is made from a photograph taken of a No. 3 FULTON PUMP at work on the 600 ft. level in the Tesla Mine at Tesla, Alameda Co., Cal.

Read what MR. O. NEWHOUSE, Consulting Engineer of the S. F. & S. J. Coal Co., has to say in regard to it.

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Perpendicular head	640.88	Discharge, measured by box center thereof, under 5 in. head equal to 1.4 cu. ft., equal to gallons per hour	4725
Gauge pressure, actual	275 lbs.	Diameter of pump cylinder	5 in.
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" point of discharge	28.95 "		
Temperature air	58 deg.		
" water	76 "		

To say that we are highly pleased with our pump expresses it very mildly

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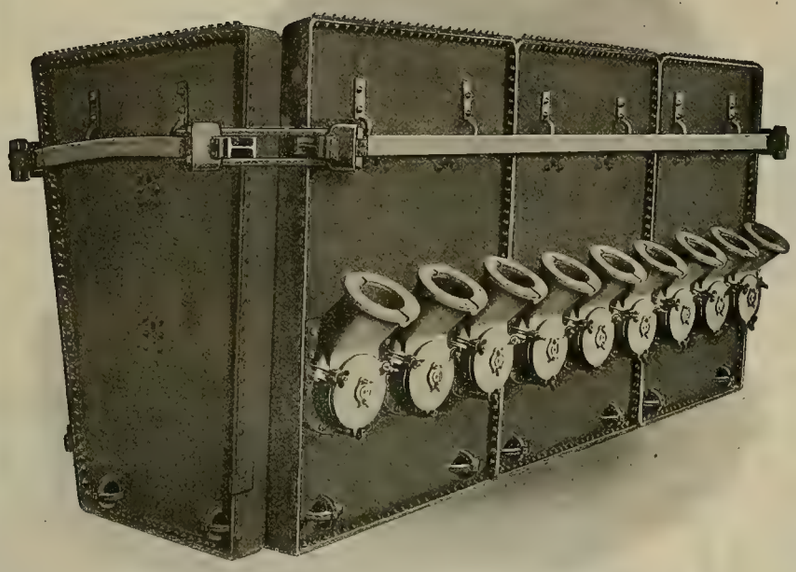

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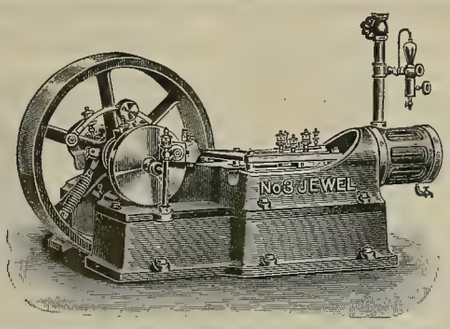

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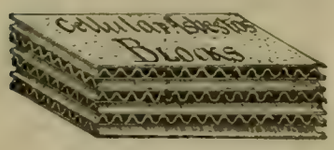

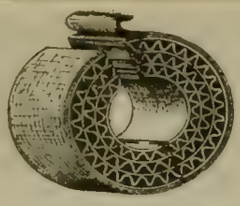

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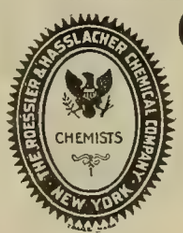

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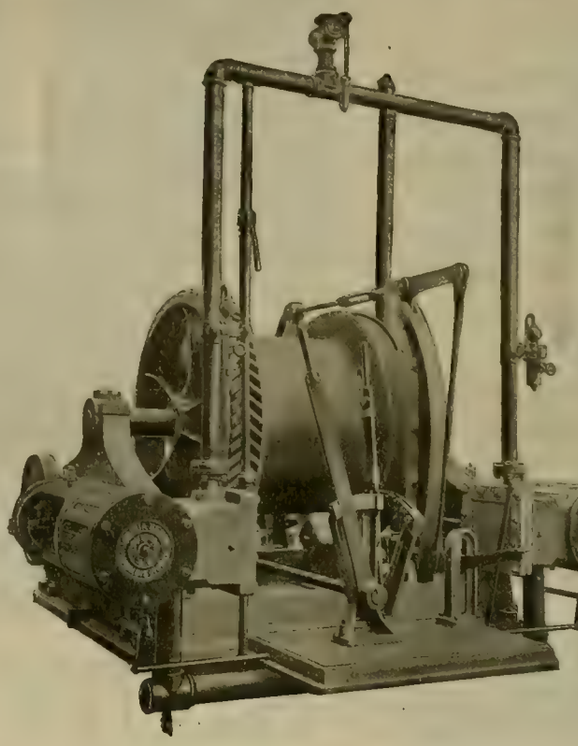

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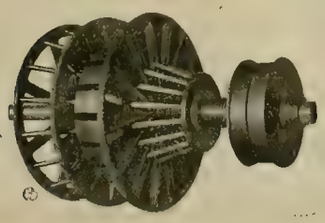

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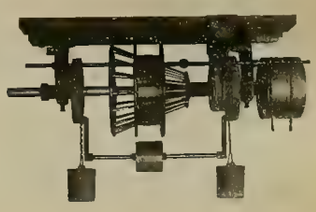

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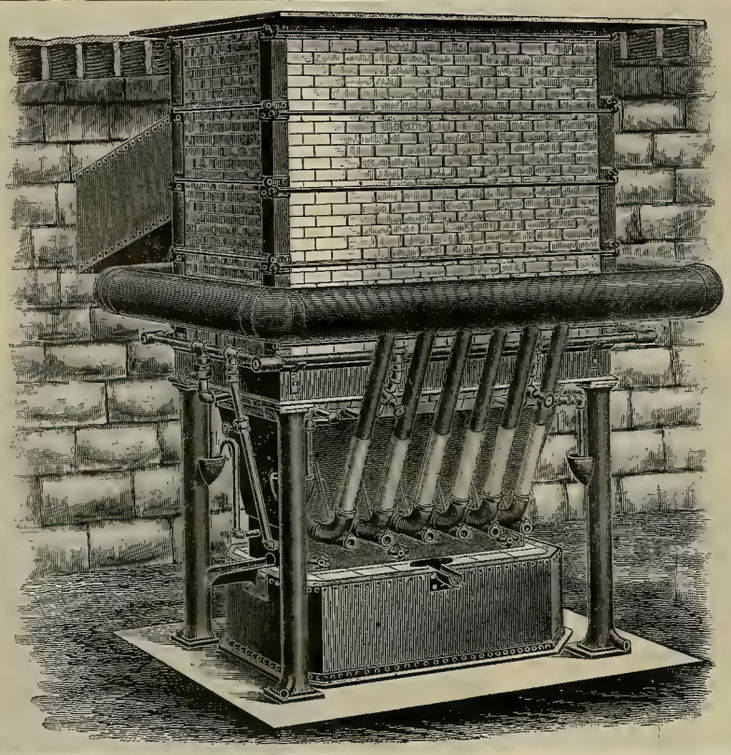

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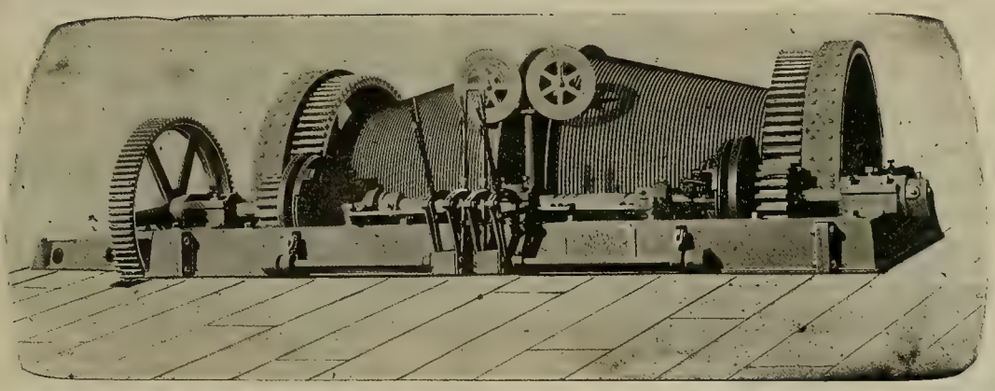
IN SUCCESSFUL OPERATION. Send for Bulletin No. 1003.



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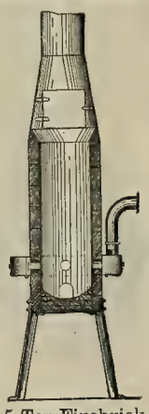

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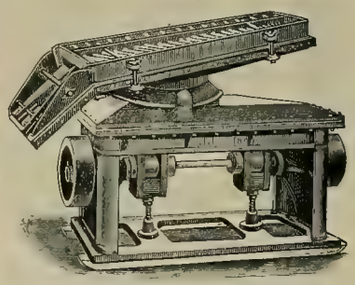

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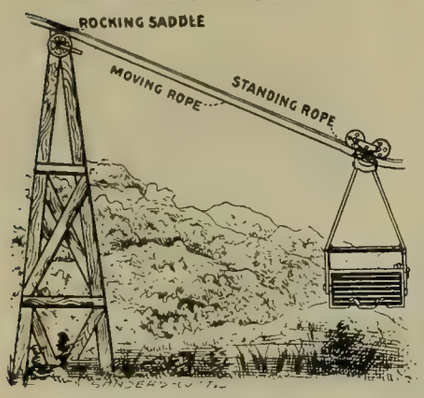

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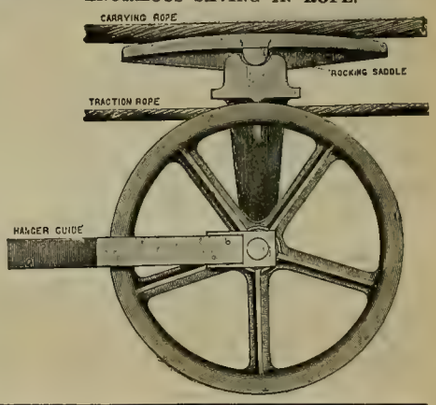

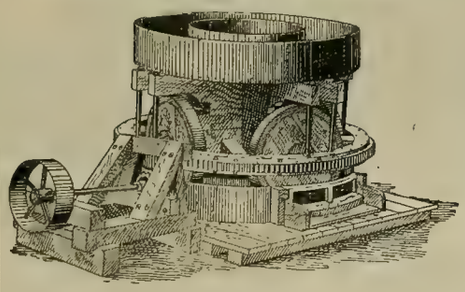

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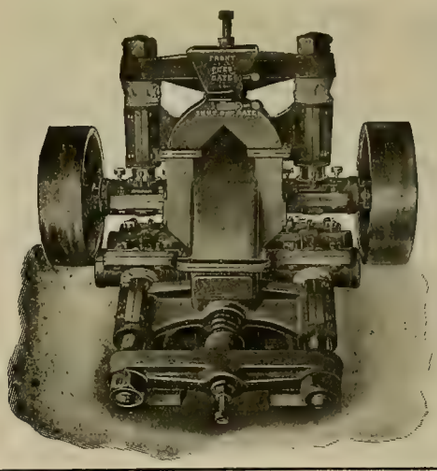

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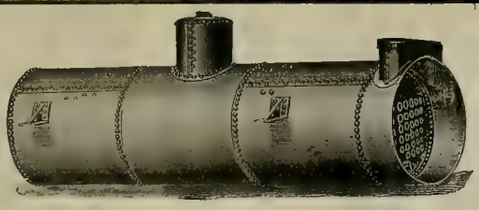

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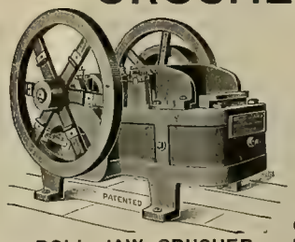

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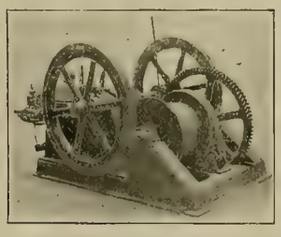

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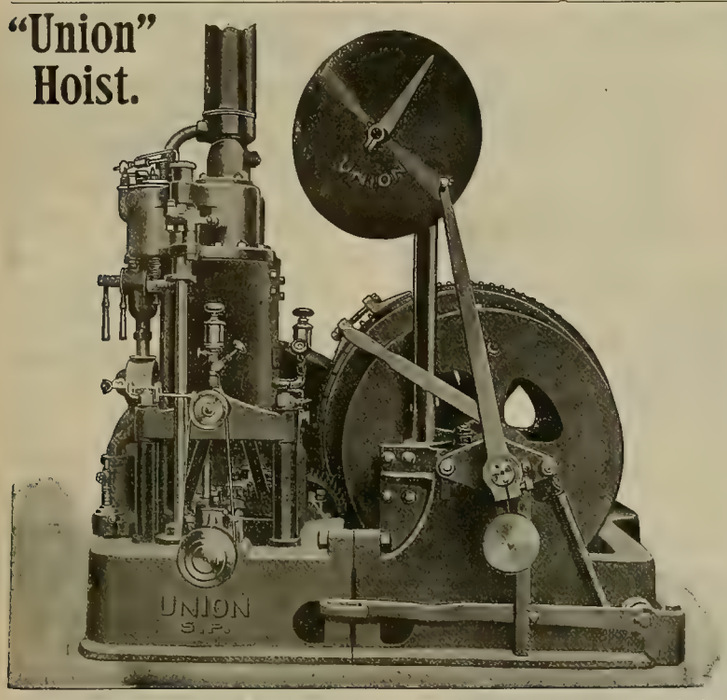
"Union" Hoist.



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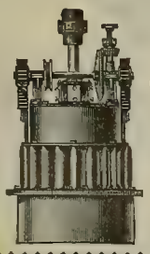

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Greatest Power from a Limited Quantity of Water, at Smallest Cost.

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4000–6000 feet per day.

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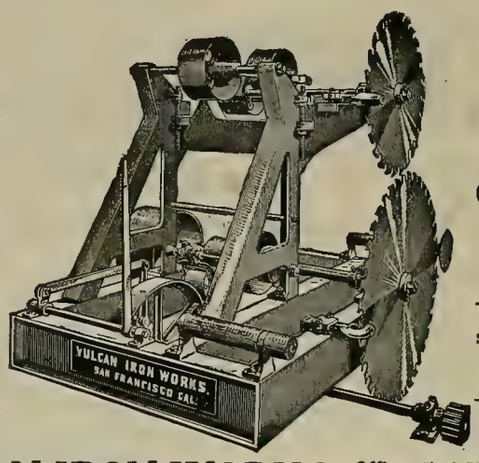

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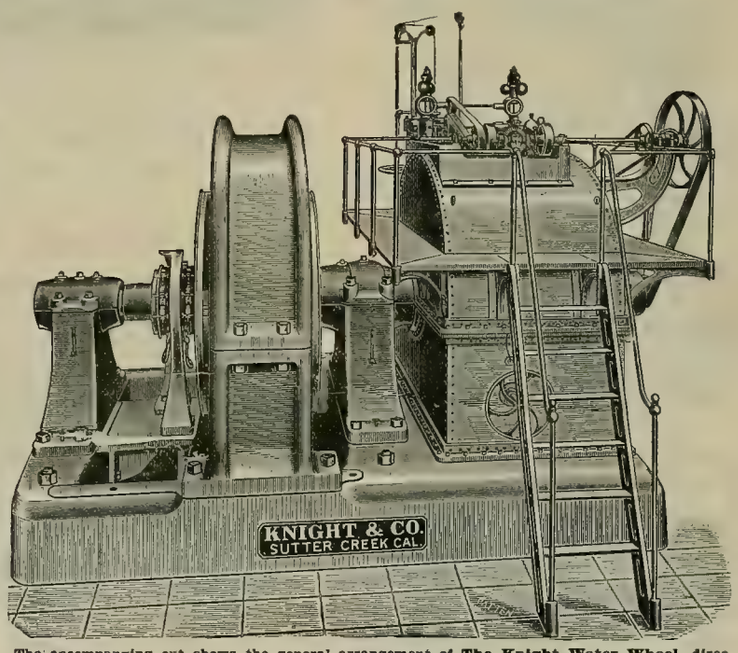

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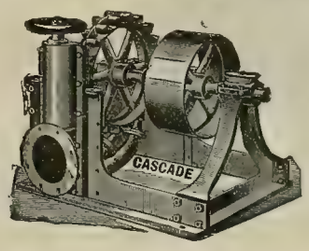

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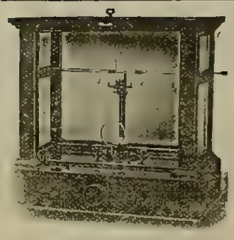

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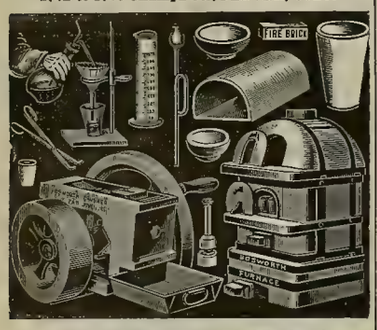

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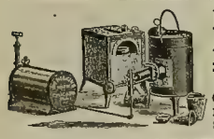

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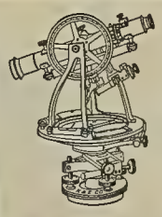

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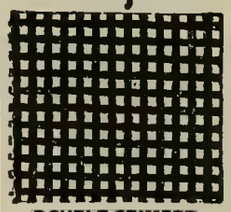

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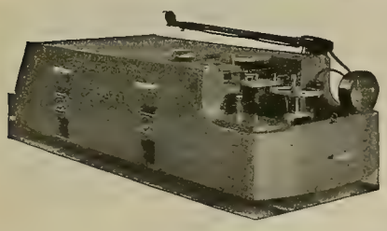

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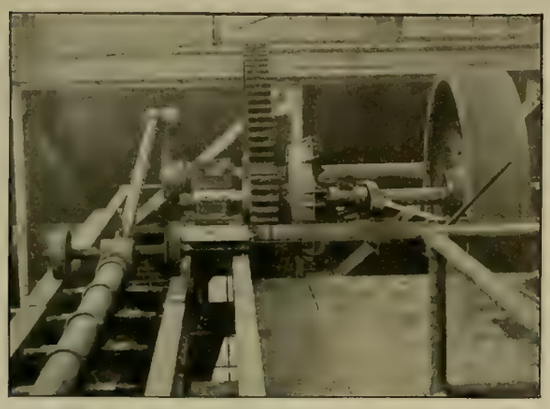

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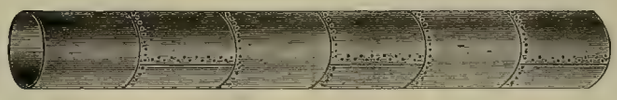

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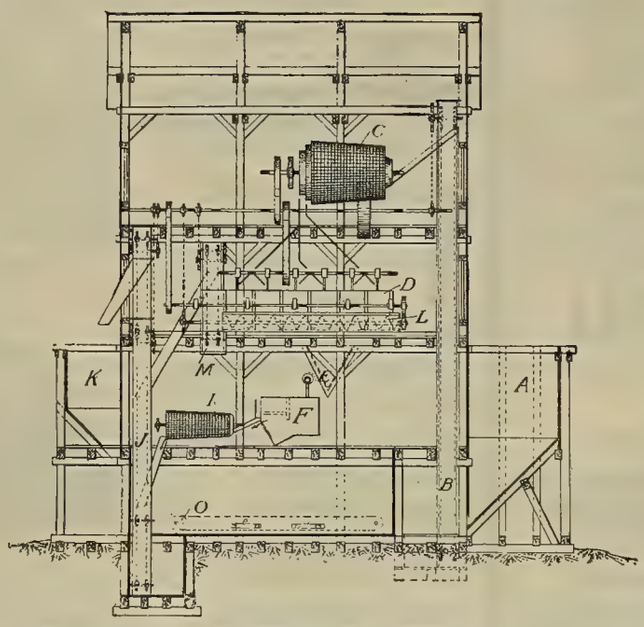

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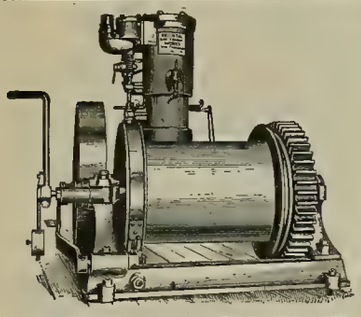

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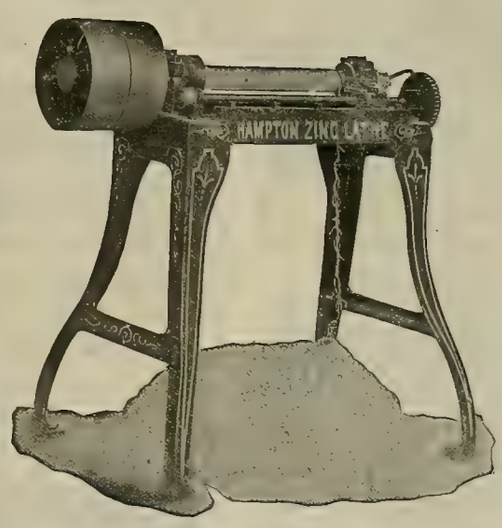

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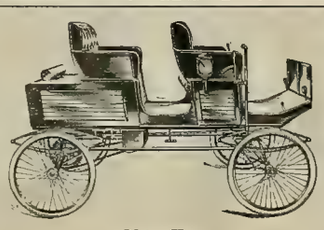

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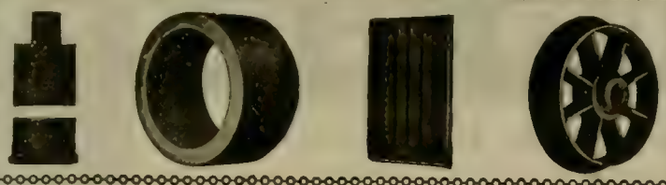

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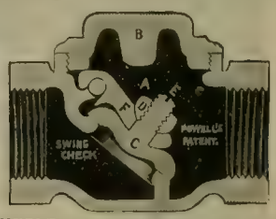

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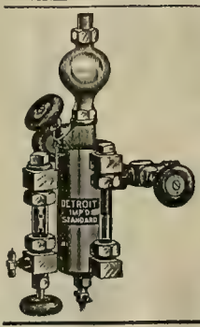

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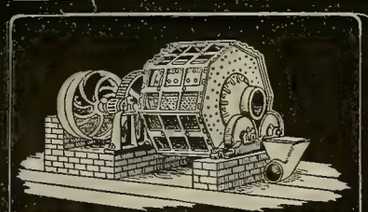

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ASSESSMENT NOTICES.

LARKIN MINING COMPANY.—Location of principal place of business, San Francisco, California; location of works, near Placerville, El Dorado County, California.

Notice is hereby given, that at a meeting of the Board of Directors, held on the 14th day of March, 1901, an assessment (No. 10) of two cents per share was levied upon the capital stock of the corporation, payable immediately in United States gold coin, to the secretary, at the office of the company, 112 Main street, San Francisco, California.

Any stock upon which this assessment shall remain unpaid on the 20th day of April, 1901, will be delinquent and advertised for sale at public auction; and unless payment is made before, will be sold on WEDNESDAY, the 15th day of May, 1901, to pay the delinquent assessment, together with the costs of advertising and expenses of sale.

By order of the Board of Directors.

N. F. REMINGTON, Secretary.

Office—112 Main street, San Francisco, California

SOUTH SLIGER GOLD MINING COMPANY.—Location of principal place of business, San Francisco, California; location of works, Spanish Dry Diggings Mining District, El Dorado County, California.

Notice is hereby given, that at a meeting of the Board of Directors, held on the 25th day of March, 1901, an assessment (No. 1) of two cents per share was levied upon all the issued or subscribed for capital stock of the corporation, payable immediately in United States gold coin, to the secretary, at the office of the company, 402 Front street, Room 8, San Francisco, California.

Any stock upon which this assessment shall remain unpaid on the 6th day of May, 1901, will be delinquent, and advertised for sale at public auction; and unless payment is made before, will be sold on MONDAY, the 27th day of May, 1901, to pay the delinquent assessment, together with the costs of advertising and expenses of sale.

By order of the Board of Directors.

J. L. DANIELS, Secretary.

Office—402 Front street, Room 8, San Francisco, California.

AMERICAN OIL AND REFINERY COMPANY.—Location of principal place of business, San Francisco, California. Location of works, Contra Costa County, California.

Notice is hereby given, that at a meeting of the Board of Directors, held on the 26th day of March, 1901, an assessment (No. 3) of five (5) cents per share was levied upon the capital stock of the corporation, payable immediately in United States gold coin, to the secretary, at the office of the company, Room 323 Parrott building, 325 Market St., San Francisco, California.

Any stock upon which this assessment shall remain unpaid on the 29th day of April, 1901, will be delinquent, and advertised for sale at public auction; and unless payment is made before, will be sold on MONDAY, the 27th day of May, 1901, to pay the delinquent assessment, together with the costs of advertising and expenses of sale.

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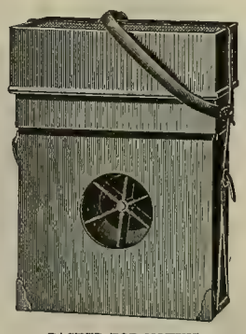

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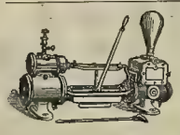

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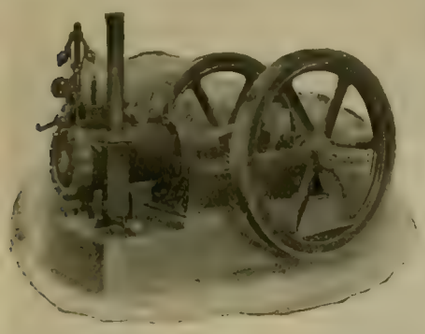

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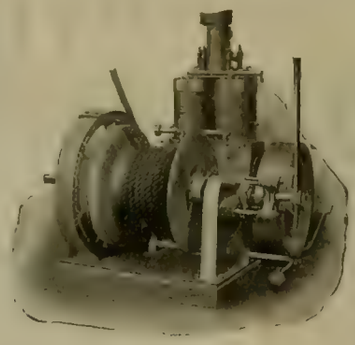

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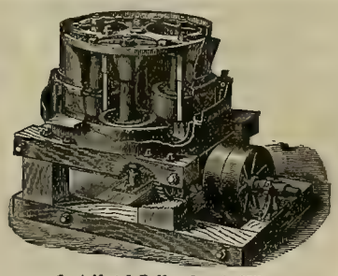

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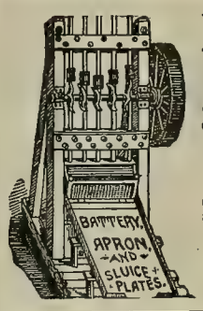

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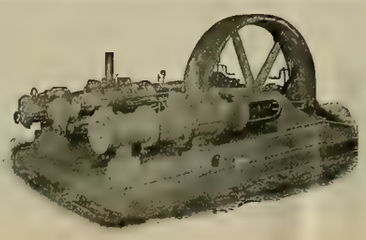

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THE "JAMES" AUTOMATIC ORE FEEDER.

THE "JAMES" ORE FEEDER,

as illustrated on this page, is a machine of improved design for the automatic feeding of ores to stamp batteries and other crushing machinery. It is perfectly adjustable while in operation, and will feed equally well ores wet or dry, coarse or fine.

Shipping weight, with wood frame, - 800 pounds.
" " " iron " - 1000 "

ADVANTAGES.

The advantages of this ore feeder, over any others that are in the market, are, that the feed is positive and will not gig back no matter how slight the motion to the arm; it can not possibly spill ore of any character and will definitely measure out from one to fifty tons per day of any class of ore.

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MINING AND SCIENTIFIC PRESS.

Whole No. 2126.—VOLUME LXXXII. Number 16 SAN FRANCISCO, SATURDAY, APRIL 20, 1901. THREE DOLLARS PER ANNUM. Single Copies, Ten Cents.

Chloriding the Dumps.

It is a long time ago in the recollections of the old miners since "chloriding the dumps" was a recognized part of mining camp life in the then far West. The expression seems to have disappeared along with the other mysteries that were once to the uninitiated a cloud of romance and imagination around silver mining. It belonged to the times when a mine was a gold mine, a silver mine, a lead mine or a copper mine, the times before metallurgical science had made out of one ore deposit a mine of all of these metals.

The first silver mining in Nevada, Arizona, Utah and the West generally, was in deposits the principal mineral of which was frequently the chloride of silver. Miners were generously careless in those old days and in working out the bonanzas of the deposits many pieces of the rich chloride mineral went out of the mine with the waste into the dump. These dumps became the paradise of the camp scavengers who picked them over for the occasional rich pieces of chloride and other silver ores, their occupation quickly becoming known in characteristic mining camp vernacular as "chloriding the dumps" or simply "chloriding."

The occupation still exists, though it is no longer one of the transient recreations of mining life, a temporary resort for a miner in hard luck. It is now an important part of the legitimate business of the industry, and a particularly safe and profitable part. Waste dumps and tailing piles are now valuable assets of every old mine once even moderately rich. The picturesque chlorider and his gunnysack have evolved into great concentrating and cyanide plants, employing large capital and men of the most advanced technical skill.

Artistically the old chlorider to whom was provided the opportunity of moderate wealth without cost or risk could not be improved. Practically his successors are far more satisfactory. There are no longer dumps in the old sense—avoidable waste is avoided in the first instance, and the methods and appliances for recovering the unavoidable wastes of first operations have been so perfected that rebellious ores—sulphides that will not amalgamate—are no longer excuses for mine failure. There are marvelously perfect concentrating machinery, economical wet chemical and electrical processes, and smelters to which can be fed anything in the way of rock that contains valuable metal with the assurance that after the fiery digestion the metal will be delivered separate from the rock. If no one of these will directly accomplish the desired result, there are other combinations of the machines and methods still available. The rare dumps which do contain pieces of mineral that can be recovered by hand picking are no longer donated to the poor and those in hard luck. They are sold to capitalists instead.

Casting a Large Bell.

The Casting of a Large Bell.

Herewith is an illustration of the casting of a large bell. The picture was taken as the hot metal was being poured into the mold. The bell is for the United States Lighthouse establishment, and is intended for the north end of Alcatraz island, San Francisco bay. It is made of genuine bell metal, as this metal, which is composed of copper and tin, has been found to produce the clearest and longest continued vibrations of any metal known. The weight of this bell is 3300 pounds, and it was made by W. T. Garratt & Co., brass and bell founders, of San Francisco, Cal.

EVERY new mining district into which prospectors, miners and seekers of sudden wealth rush, in turn receives the condemnation of the disappointed ones. The mines do not go down—they are only surface pockets—are statements of these people, intended to discourage the work that they will not themselves do, for their disappointment has not followed failure of their mining work, but failure to do any work. The real trouble is that these miners do not "go down;" the mines may, for all they really know.

PART of the city of Butte, Mont., adjacent to Senator Clark's mine, is settling and sliding. The newspaper geologist gravely explains it by saying that the city is built on a gravel bank and that the weight of the gravel is breaking down an old volcanic cone underneath, therefore the sliding. Why not explain what the combined weight of the volcanic cone and the gravel is breaking down? Virginia City, Nevada, has had similar experiences.

Mill of Granite-Bimetallic M. Co., Phillipsburg, Montana. (See page 189.)

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San Francisco, April 20, 1901.

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The Beginning of Petroleum.

Recent explorations in sea waters have proven that light does not penetrate more than 300 feet beneath the surface. Beyond this depth marine plants dependent on light for life cannot exist. Marine animal life is known to exist in all sea depths. Excepting such areas as the Saragossa sea, where there is a vast accumulation of floating marine vegetation, the latter only lives in the shallow marginal waters next the land areas and on shallow banks. On land areas plant and animal life are coexistent everywhere.

Consider, now, the present time as part of a geological period, and that plant life and animal life in the individual, once dead, become decomposed, part of the body disappearing in the atmosphere in gases, part in fluids—including dissolved solids—disappearing ultimately in the sea water, and the third part as solids, insoluble, remaining in place. It is clear that what identity remains in that which was the individual plant or animal must reside in the solids remaining in the place of death, which for reference, conforming to common usage, are called the remains.

Animal remains of the life of yesterday and to-day are restricted to the bony parts of the individual, the parts where there is either no carbon tissue with what, for distinction, are termed inorganic or mineral substances, or only a minor portion of carbon tissue. All of the carbon of the organic or carbon tissues disappears in gases into the atmosphere or in fluids, ultimately to the sea. None of it remains with the inorganic or mineral part. A striking illustration of this is in the bodies of mammoths found frozen in the Tundra ice of northern Siberia. These preserved ages in sealed cold storage were untouched by heat which would decompose. Other individuals of the same kind, dying before the time of the ice sheet, became buried beneath stream drift before the carbon tissues could disappear, since the bony remains are now found naturally disposed. Yet, after that burial and before the coming of the cold, the carbon tissues did disappear in gases and fluids. Did they not, the same cold that preserved the bodies in the ice would have preserved the undecomposed or partly decomposed carbon tissues in the frozen ground.

Plant remains of the life of yesterday and to-day, like the animal remains, disappear in part as gases into the atmosphere, part as fluids into the sea, and part, as solids, remain in place, to more or less preserve the identity of the individual. But, in the case of the plant remains, there is in addition to the inorganic or mineral part corresponding to the bony part of the animal, some of the carbon tissues. All of the carbon does not disappear.

The preceding has had more particularly in mind land animals and land plants as being most naturally within direct observation and knowledge. Sea animals do not leave remains in the same sense as land animals. They do not die natural deaths. Each kind of marine animal lives by consuming some other marine animal, and is itself in turn food for a succeeding marine animal. But, when rarely they do die, naturally the carbon tissues disappear absolutely, leaving only the inorganic minerals as remains. So far as is known, the death or after-death of marine plant life is exactly the same as if it were land plant life. Some of the body of the individual disappears in gases, some in fluids, and a third portion, including some of the carbon tissues, stays in the place of death.

What is true of the individual is true of the mass, which is only the sum of an indeterminate number of individuals. In certain land conditions the carbon of land plants cumulates and becomes first vegetable humus, next peat. Such accumulations of carbon of land plants made in determinable geological periods are now coal. Where the bony parts of land animals of the same determinable geological period as a particular coal are most plentiful, there is no trace of the carbon tissues; all of the carbon has disappeared.

Marine plant remains of carbon tissues, if, as this paper holds, there are such, and if accumulations are made, would accumulate in the places of growth, in lines or bands of varying width, occupying a portion of the shallow sea bottom plane inclining away from the land surface. These bands or lines next the shore would have their limiting edges in a depth of water and distance from the shore which would be without the sweep of the surf; away from the shore their edges would be the line of depth below which the influence of light does not extend and below which marine plants could not live.

Marine animal carbon remains, if there be such (this paper maintaining there are not), would have no limitation of locus to a line having a definite relation to a shore line, but would accumulate indifferently in any part of the sea's bottom.

If accumulations of marine remains, plants and animals have been made in past geological periods, these remains if preserved would exist—the plant remains in a line or band of rock roughly parallel to and following an unconformity of stratigraphy, the old seashore line, the animal remains indifferently anywhere superficially.

The preceding, indicating logically where marine plant and animal carbon remains, assuming such to exist, would accumulate and become fixed in rocks formed from sediments, the reverse reasoning, from the sediment-formed rocks, can be tested by the constructive facts. All sea-formed sediments receiving animal carbon remains evenly disposed, supposing the existence of such, then all sea-formed rocks should contain evenly disposed carbon or carbon products. Some lines of sea-formed sediments receiving plant carbon remains—assuming their existence—then some lines of sea-formed rocks should contain carbon or carbon products. And as some lines or bands of sea-formed rocks roughly parallel to an unconformity—the old shore line—are found to contain carbon and carbon products, therefore the reasonable presumption would be that marine plant remains, rather than marine animal remains, were the beginning of petroleum. The conclusion becomes more reasonable and more the result of the application of logic, on considering the chemistry of decomposition succeeding the death of the individual and preceding the comparative fixidity in rock of the remains. From the individual land plant that dies to-day there are carbon remains after the decomposition. From the individual land animal that dies to-day there are no carbon remains after decomposition. For land plants the carbon preserver is fresh water, for land animals the carbon dissipator is fresh water. There is no reason deducible from chemistry why sea water should not act substantially as fresh water does. And, assuming that it does, the carbon of marine plants would remain after decomposition, and the carbon of marine animals would not.

The identification of the carbon-bearing rocks, whether land born, as are the coal measures, or sea born, as are the petroleum sands, is conclusive. The conditions of carbon accumulation are dissimilar. In the land plant-formed carbon deposits the accumulation was effected by successive growth and death of plants under conditions that did not normally bring any water-carried sediments to mix with the carbon. Thick deposits could be, and were, formed of practically pure carbon and carbon products. In the sea-formed carbon deposits the accumulation was under conditions which facilitated the deposit of sediments with the carbon, and under which large quantities of sediments were continually being brought to the situs of the deposit. Naturally, then, these sea born carbon deposits could not make coal beds, but could make a carboniferous shale.

The attempt here made is to fix the beginning of petroleum, to give the beginning a place, and to give it a legitimate logical parentage. The next steps—how the carbon remains became petroleum, how the petroleum came to the place where it now is, and the relation of the present habitation to the habitation before the change of state—are other problems, simpler of solution when there is a determinable beginning. The two first of the questions have been long since answered; the third all but suggests its own answer. The sea born carbon deposits have not moved far from the place they were laid down into beds—above or below some, sideways very little.

The California explorations have been the suggestion of the preceding. The petroleum-bearing rocks are younger than the petroleum rocks of other localities. They are not so covered with still younger rocks, and the unconformable contact indicative of old shore lines is clearly in evidence. The dynamical geology of the rocks, as well as their stratigraphy, has been very fully and intelligently studied. The whole is on such a grand scale that the misleading effect of complex detail is avoidable. No such conclusive study is possible in Pennsylvania or Ohio. It may be in Colorado and Texas. The conclusions expressed, however, are applicable to all petroleum fields and are not controverted by the knowledge existent of the other or older districts. It is probable that if the geology of these could be really known the conclusions here stated would be affirmed. In both Pennsylvania and Ohio the petroleum deposits are in long, comparatively narrow lines or bands, which could be sediments laid down in the shallow waters next an old shore line.

In California and the new fields of Texas and Colorado the conclusions have a definite practical value in analyzing unproven ground as to possibilities. In California what is known as the Coast Range was at the beginning of petroleum a chain of islands, a counterpart of the island barrier of southeastern Alaska to-day. Between it and the land now the Sierra Nevada range was a great gulf or sound. Erosion provided the sediments which in time filled the sound and made the Sacramento valley. In the sheltered shallow water bordering the islands and the mainland the marine plant life thrived and its remains mixing with the sediments were the beginning of the petroleum.

JUDGE DIXON, in his decision enjoining the American Smelting & Refining Co. from purchasing the plants of M. Guggenheim & Sons, found that the value of the latter as physical possessions, including the cash to be turned over, did not exceed $10,000,000, and that about $23,000,000 of the $33,000,000 of stock for which they were to be bought was represented by good-will of the business and leases and contracts, the details of which were not disclosed. The consolidation has been made despite the decision, which it seems was anticipated, but the court findings of the actual value of the Guggenheim plants will continue to be advisory information of the best description to intending competitors in the smelting business.

THE Canadian Government has had under consideration the establishment of a mint at Dawson which would make a coinage charge of 5% instead of royalty on gold. The idea was that as the gold was taken in local business transactions at an average of $1 an ounce less than the coinage value it would go to the mint instead, as the 5% charge would be less than the $1 discount of the merchants. Had this been done the Government would have gained, as all of the gold mined would be turned in for coinage, and the miner would gain by the difference between the two shaves.

Concentrates.

FIFTY YEARS of gold mining in Australia have produced $2,170,000,000.

THE first electric railroad was from Port Rush to Giant's Causeway, Ireland.

THE fourth annual session of the International Mining Congress meets at Boise, Idaho, July 21-25.

ALABAMA MINES in 1900 produced 650 tons of bauxite, the aluminum mineral used as the commercial source of that metal.

THE United States District Court in Oregon has decided that miners in that State cannot take timber from public land for mining use.

CRUDE PETROLEUM is measured by barrels of forty-two gallons, equal to 5.6146 cubic feet; refined petroleum by barrels of fifty gallons, equal to 6.6840 cubic feet.

THE Bay Counties Power Co., in suspending their 4400-foot long cable across the Straits of Carquinez, first let it sink to the bottom and then drew it over the towers into place by a steam engine.

NO UNITED STATES law requires the recording of a notice of location of a mining claim except in Alaska. Several of the States and Territories have statutes that require the recording of such notices.

THE Colorado Supreme Court has decided that, though a prospector may believe a lode to exist within a patented placer mining claim, he has not the right to enter on the land for the purpose of exploring to confirm his belief.

IF a piece of steel which has been magnetized be broken into several pieces, each of the pieces will become a magnet. This is true independent of the size of the fragments; pulverized, the separate particles will still remain magnets.

PERCUSSION CAPS are filled with saltpeter and other ingredients. Detonating caps contain from seven to fifteen grains of fulminate of mercury, according to the strength required, and the shell is made five or six times longer than for percussion caps.

GOLD crystallizes in the Isometric system. The form is that of two four-equilateral-sided pyramids set with their bases together. Perfect crystals are rare. They have been found in what are locally known as "seam diggings," in Placer and El Dorado counties, California.

THE deviation of the magnetic needle is influenced by the presence of great masses of certain eruptive rocks, notably basalt, andesite and some serpentines. It has been found that large masses of the first-named can attract the north pole of the needle at a distance as much as 50 miles.

SMALL articles may be coated with silver by first dipping them into a solution of common salt and rubbing with a mixture of one part precipitated chloride of silver, two parts of potassa alum, eight parts common salt and eight parts cream tartar, after which the article being so coated is washed and dried.

WIRE usually shows a slight variation of diameter from exact gauge, being usually a small fraction of an inch larger. The amount is sufficient to be taken into account in some kinds of work. Hammered drill steel shows more variation than that manufactured in the rolls. The variation is as much as a sixteenth of an inch.

IN cyanide practice the surplus solution is usually run off with the spent tailings. There is an unavoidable loss of solution, and at present there is no cheap means of recovering the cyanide from the surplus solution. The potassium cyanide might be precipitated by means of zinc sulphate; but that is believed to be too expensive a process to warrant recommendation.

IT rests with the owner of a mining claim to do the $100 of assessment work, and against the possible misconduct of an employe in neglecting to do the work, though fully paid to do it, and making affidavit that he had done it, the owner must protect himself by knowing that the $100 of work was in fact performed. Failing to do this, the claim is open to be located.

A GOOD wiping solder is an alloy of equal parts of tin and lead. Any metallic impurity impairs the quality. Care must be exercised in using it in soldering zinc or galvanized iron. If the zinc gets into the solder it makes the solder spongy and it will not wipe, becomes worthless. The presence of the zinc can be noticed in the crystallization which it forms on the surface of the bar.

CADMIUM is a silvery white metal somewhat harder than tin. Its usual occurrence is as the sulphide, greenockite, associated in small quantities with zinc sulphide, sphalerite. Commercially the supply is obtained incidentally in reducing zinc ores. In smelting them the cadmium distills over first, oxidizes, and forms a brown powder in the receivers. This is mixed with charcoal and distilled, yielding very pure metal.

VERY simple appliances save nearly all the gold in placers exploitable by a working miner. Some loss is inevitable with the first washing, but it is rarely more than 10%. To lose half of the gold it would have to be thrown away. The tailings from hand washed ground may pay for reworking after fully air slacked by handling them in quantity. It is customary in California to sell the tailings from drift mines to Chinese.

BLANKET SLUICES are still used to some extent. The chief advantage is that when set at the proper angle for the ore and frequently cleaned they will save fine amalgam. They have been employed to handle the vanner tails, and, as such, save some of the slimes that pass the tables. To use them or not depends simply on two questions: Is the loss past the machines unavoidable, and, if it is, do the blankets save more values than the cost of saving?

THE next meeting of the American Institute of Mining Engineers is to be held at the city of Mexico in November of this year, and part of the programme will be excursions to many interesting points. It is intended to translate the papers read at this meeting and to publish in Spanish and English. The secretary, R. W. Raymond, desires early notice of papers for the meeting and that the manuscript of accepted ones should be delivered to him by July 1st.

IN grinding two metal surfaces so that they will fit true, the surfaces should be run over with by a file to reduce the larger inequalities. Clean the surfaces thoroughly and wipe both clean. For grinding, use fine sand sifted through a screen. Mix with water and apply a small quantity at a time, first to the parts that grind the hardest. Work rapidly, pressing lightly and turning. Apply water and grinding sand till an even surface is obtained; then work with the old sand—that already on—to finish up.

QUICKSILVER which has come in contact with the smallest portion of grease or resin becomes sluggish, and comparatively large grains of gold will float upon its surface without being amalgamated. Its brightness changes to a dull leaden color, and it flours easily. Distillation will not suffice in the case of resin or grease, for both pass over in retorting and condense again. In such a case frequent washing of the mercury in a strong solution of potash overcomes the flouring and sickening of the quicksilver.

THE School of Mines at Columbia University has changed the character of its laboratory instruction for mining engineering and now aims to familiarize the student with the principles of typical processes, and the instruments of precision employed in connection with them, rather than to teach him what can be termed in distinction the manual handling of processes. The students of metallurgical engineering have much more of the latter class of instruction and more specializing. The change recognizes the every-day practical difference of service required of the mining and of the metallurgical engineer.

A STEEL-LINED CHAMBER at the foot of an elevator shaft, built in such dimensions that in the event of the elevator falling it will compress the air in the chamber and break its fall on the air cushion, is used in a number of high office buildings in New York, and has been found on trial to work successfully. The conditions under which a cage is ordinarily used in a mine shaft make a similar device in it impracticable. What is wanted in a mine shaft are means for stopping the fall of a cage before it starts—that is to say, after the hoisting cable has broken, and before the cage has gathered momentum downward.

THE unscreened mixture of sand and gravel just as it is shoveled up from a river bed can frequently be employed for concrete. It has been so used in the construction of a concrete overflow dam and ditch headwork on the North Fork of the American river, near Auburn, Cal. The dam is 300 feet long and 35 feet high in the middle. It was constructed below a timber dam, the latter acting as a coffer dam and remaining in place while the other was under construction. Using the river sand and gravel just as it came, the principal item of cost was the cement. The sand and gravel required no hauling, being taken from the filling of mining tailings behind the timber dam.

THE peak load on an electric motor, used as the measure of electrical power which that motor is supposed to be consuming, is the highest reading shown by the graphic diagram made by the wattmeter. Used in a contract between a consumer of electric power and the company furnishing the power as the basis of the payment to be made, it means that the consumer agrees to pay for the power as if the quantity that he received averaged the highest amount that was taken at any time in the period of the contract. In electric power used for hoisting the variations of load are very considerable, and the peak load shown by the wattmeter is far above the actual average of power consumed. In operating mill machinery the power used is more nearly constant.

THE United States Mint never makes assays of ore for any one. The only assaying done at that institution is of gold dust or bullion to determine its fineness and consequent value. If a miner brings in gold dust or bullion the lot is assayed in order to ascertain its fineness, and he receives returns in accordance with its value. This fineness of the gold is the only thing determined by assay at the Mint, except the value of the silver possibly contained in it, and ore assays are never made. Both the United States Mint and the California State Mining Bureau are occasionally asked to do assay work, which is really the business of private parties. The Mining Bureau will make determinative tests of ores and minerals in a qualitative but not a quantitative way; that is, it will determine the character of a mineral or tell what metals an ore contains. But it will not attempt to ascertain the quantity or value of the contents. To make quantitative assays free would be interfering with the business of private assayers. As miners generally care more to find out the quantity and value their ore contains than its mere constituents, they would better apply to an assayer in the first place. Certificates of assays of ores represented to have come from either Mint or Bureau are false.

LARGER amounts of mining and milling machinery are being made than formerly, since there are so many more producing mines; but there is not an increase of machinery in proportion to the number of mines being worked. Formerly almost as soon as a ledge was struck, or purchased by men with money, a stamp mill with full equipment was ordered, with the expectation that it would shortly repay the investment. The proper development of the mine was an after consideration. Men now start in with a hand windlass for hoisting. When they get water they start with a common pump. Then horse power is used for a while, followed by a small gasoline engine for hoisting and pumping. When necessity requires a steam engine, hoist and pumps are put in. But all this is done before any attempt is made to get ore reduction machinery. Then when it is finally proved that they have a mine the owners get a mill, concentrator, etc., but usually want the mine to pay for it. There is rarely any attempt to start out with a fully equipped milling plant. Many mines will not warrant a special mill, and custom mills are resorted to for crushing the ore. There are many custom mills in the mountains and hundreds of mines depend upon them entirely; a mine may be worked for years before it is decided to give it a mill of its own.

IT is not deemed well to locate and try to hold several thousand feet of mining ground. A miner who has too much is worse than land poor, because it takes about all his time and money to keep up the annual assessment work required by law. On this plan not one of the claims can be properly developed, and only a little gophering done on all. By concentrating the labor on one, or even two, claims something worth while can be accomplished. Purchasers are shy of prospects which have been held several years by assessment work only, but if they see that a miner has really made an effort to open one it gives an idea of value to the claim, making it more salable. Men sometimes want to take whatever mining ground is in sight, arguing that if 1500 feet on a ledge is good to have 6000 feet is ever so much better. Experience has proved the fallacy of this idea. Fifteen hundred feet is the length of a single lode claim allowed to an individual by the Government, and it is usually as much as one can well handle. It is better to have a real mine on that much ground than a dozen mere locations on four times as much. A piece of mining property moderately well opened is of some value to the owner, whereas a dozen prospects with 10 or 15-foot shafts amount to little. Such locations cannot be sold and they bring no profit to the owner, while requiring certain work each year to retain legal ownership.

NICKEL commercially occurs as a constituent of what is called nickeliferous pyrrhotite, characteristically found in the eruptive rock known as gabbro. In this rock the minerals occur as original constituents of the fluid or semi-fluid rock, collecting in the cooling process in the portions of the mass near contacts. The minerals, where they are in commercial quantities, form ore bodies that are lodes, though they could not be described as ledges. That is, the ore bodies do not have walls, except the contact formation, but the values grade out more or less sharply into the gabbro or its successor, serpentine. The ore usually contains some copper and 2% to 4% of nickel; the latter would constitute a high-grade nickel ore. Cobalt almost invariably accompanies the nickel. The Sudbury, Canada, deposits are the most extensive known and the most cheaply mined. Practically the output of these mines dominates the market and makes the price. Unless the quantity found in a new deposit is considerable, or the nickel is associated with gold, silver or copper so that its recovery is incidental as a by-product, its commercial exploitation should be deliberately considered in advance. Few matting plants are prepared to smelt it in small lots. Where the ore in addition to the nickel carries silver and gold in commercial quantities the smelters who would buy the ores for these metals can probably be induced to pay something for the nickel.

OFTEN a man can tell nearly as well with a hornspoon or pan what amount of free gold there is in the rock about as well as he can by assay. The percentage of sulphurets and their value must be determined by an assay; but for ordinary purposes the horn will show whether there is value enough in the rock to lead a man to continue work on his find. The probable yield, as a rule, can be determined as well in this way as by a fire assay. The latter is often misleading in gold ores, unless exceedingly careful sampling is done. Averaging up a number of assays is not nearly as satisfactory as a number of horn or pan washings, as far as ascertaing value is concerned. A prospector, moreover, cannot well be bothered with packing around an assayer's outfit, as these things are expensive and hard to take care of. Of course, if a man is settled down in some camp, it is well to have these appliances and to understand how to use them. Assayers are to be found throughout the mountains, even in out-of-the-way places, and their charges are reasonable. In a silver, copper or lead country a few qualitative tests are easily learned, and, with some experience, a good guess may be made of quantity in the ore, enough at least for the prospector's purposes. For blowpipe work considerable skill is required, and few do assaying with that implement. In a gold country it is a waste of time for a man going prospecting to undertake to learn assaying.

The Granite-Bimetallic Con. M. Co.'s Mill.*

Written for the MINING AND SCIENTIFIC PRESS by A. D. MOFFAT.

This mill is located in Granite county, near the town of Philipsburg, Mont., and about 3 miles east of the great bonanzas, the Granite and Bimetallic mines—the Granite with a record of $12,140,000 and the Bimetallic with over $1,630,000 in dividends, a total of $13,770,000.

The ore is delivered to the mill from the mine by a Bleichert aerial tramway, and the coal used at the mines for steaming purposes is forwarded on the upgoing buckets; so that the cost of handling the ore and coal is nominal. The tram buckets hold 500 pounds of ore, and they are loaded on the return with 250 pounds of coal. At the terminals of the tramway the ore is discharged into bins, where the salt is mixed with the ore for chloridizing or converting the sulphurets of silver to a chloride of silver. The elevation of the ore house is sufficient to feed the ore direct by automatic feeders from the ore chute into four rotary drying cylinders. These drying cylinders are so arranged that the ore discharges into four large hoppers, which hold from twelve to fifteen tons; these hoppers are located back of the battery, where the dry ore is drawn from them, weighed and distributed into the battery hoppers.

The battery consists of 100 stamps of 1000 pounds each, dropping 8 inches, 100 drops per minute, and crushing, through a 20-mesh screen, 2.1 tons to the head every twenty-four hours.

To the practical man this tonnage will seem high, as it has always been considered good crushing at 1.125 tons to the stamp where the ore and salt were mixed together. If we were crushing the salt in a separate battery, as most mills are, our tonnage would be greatly increased. It is well known that after salt passes through the driers it absorbs moisture and gums the screen, retarding a free discharge from the battery. It will readily be seen that the ore from these mines is not hard to crush. The ore is a sulphuret and has no free chlorides in it. There is some native silver, for, while the chlorinations run from 83% to 85%, the extractions are 90%.

There have been two Stetefeldt chloridizing furnaces constructed in the mill this year of greater capacity than any heretofore built. Each will successfully chloridize from 100 to 110 tons of ore per twenty-four hours.

The mill is arranged in two parts. The No. 1 furnace is 51 feet 4 inches high from the drawing floor to the top of the furnace, or main shaft. There are five hoppers—one in the main shaft, one in the return flue and three in the telescope.

There are sixteen dust chambers, 3:4x9 feet, and 3:4x6 feet openings. No. 2 furnace is 51 feet 4 inches high, with four hoppers, stack one return and two in telescope, with twelve dust chambers, each 4x10 feet, and 4x6 feet openings.

There are two cooling floors, each 25x275 feet, with a capacity of 500 tons roasted ore. The drawing floor is 8 feet higher than the cooling floor, being 13x275 feet. It will be readily seen that this cooling floor capacity gives ample time to perfect the chlorinations before going to the pans for treatment.

The pan room, or amalgamating department, is 308 feet long, having forty-two pans, twenty-one settlers and two clean-up pans. This department is in front, parallels the batteries, and is situated between the cooling floors. There have been added to the mill this year three 9-foot water-seal gas producers, which furnish the gas for drying and chloridizing the ore. These producers consume fifteen tons of coal per twenty-four hours in drying and chloridizing 220 tons.

On Aug. 9th we discontinued the use of steam in operating the mill. The engine used up to this time to furnish the power was a Fraser & Chalmers cross-compound condensing 500 H. P. The present power is electricity and is furnished by the Montana Water & Electric P. & M. Co. The water for driving the generators at the power house is brought from Flint creek and is conducted to the power plant through a plank flume 7500 feet long, and has a carrying capacity of 2000 cubic feet flow per minute, discharging into a head box. From this box a 36-inch diameter steel pipe, 1500 feet long, with a fall of 690 feet, carries the water to the receivers at the power house. The receiver is built to supply four water wheels. The power house is 100x30x40 feet. It is located 9 miles from Philipsburg.

The generating units installed consists of two 550 kilowatt (or 737 H. P.) Westinghouse three-phase alternators, generating at 440 volts, and direct-connected to two 900 H. P. Pelton wheels. The governing of these wheels is controlled by an electric governor. In addition, there are two 125-volt, compound-wound exciters of 22½ kilowatts (30 H. P.), each direct-connected to two 50 H. P. Pelton wheels. Each of these machines has a capacity for the field excitation of both alternators.

The real energy of the circuit is shown by a polyphase intergrating wattmeter. The transformer equipments consist of four 200-kilowatt raising transformers with 440 volts primary and 16,000 volts secondary at the power house and four 150-kilowatt lowering transformers, 15,000 volts primary and 440 volts secondary at the mill, a transformer being held in reserve at either end of the line. The transmission line is 6½ miles in length and is set with the best cedar poles and strung with four No. 6 gauge copper wires, three of them being used for carrying the current, and two transpositions being made to counteract the effects of mutual induction.

The line is protected at each end by the lightning arresters. The motor equipment in the mill consists of two 100 H. P. 400-volt Tesla motors, operating the pans and settlers; two 100 H. P. 400 volts and one 50 H. P. 400 volts operating the batteries; two 20 H. P. 400 volts operating the elevators, fans, bolters and furnace feeders; one 30 H. P. 400 volts operating the dryers, and one 10 H. P. 400 volts operating the coal and salt elevators.

It will be readily understood that the number of motors and the way they are placed in the mill greatly expedites matters in stopping and starting any part of the plant. Formerly, if a rivet came out of the main belt it meant, at least, an hour of lost time, as they would have to hang up a hundred stamps, drop the pan mullers and stop the engine, in order that the repair gang could replace the rivet in the belt. That hour of lost time meant tons of ore not crushed.

Credit is due Paul A. Fusz, president of the Granite-Bimetallic Co., for the pluck, energy and perseverance he has displayed in remodeling this mill and installing the electric power plant.

The entire plant is full of interest to the practical man, and a trip of inspection through it will convince him that this company has a "modern and up-to-date plant."

*See illustration front page.

Efficiency of Rock Drills.

Let me know upon what is based the efficiency of rock drills. Has there been any method devised for testing the force of the blow, the pull and the twisting moment?

Berkeley, Cal. T. G. S.

In response to the above, an expert on the subject says:

I am not aware of any systematic tests performed to precisely determine the exact strength of the blow, the back pull and the twisting moment. In fact, I do not believe that deep scientific research in this direction would be justified, or rather would lead to anything like absolute and useful rules, for the following reasons:

A rock drill—I mean the most common variety, i. e., the percussion rock drill driven by compressed air—is essentially and admittedly a machine of low mechanical efficiency, if this term implies that the amount of work done by the compressed air in the cylinder of the rock drill is only a small percentage of the work expended in operating the compressor.

Experience shows that a successful rock drill must fulfill a number of requisites, among which the mechanical efficiency is not by any means the most important. The methods which would naturally suggest themselves to improve this efficiency would, at the same time, make the machine unpractical, and the best that can be done in this direction is apparently to eliminate all hindrances to the delivery of the blow from the piston to the rock, i. e., to avoid cushioning on the fore end of the piston, and to maintain the full pressure of air on its back end as long as practicable. Quick action is also a desirable feature, and means wide and short passages between the valve chest and the cylinder at a possible increase in the air consumption of the machine.

But while these requirements may be said to always exist, they must be satisfied to various degrees, according to the nature of the ground. The true value of a rock drill is ultimately gauged at its capacity for making a rapid advance in a given sort of ground, and this involves not only the percussive power of the machine, but also its adaptation to mudding, i. e., to keeping the hole free from obstructions.

The result is that an efficient machine, i. e., one designed to deliver a powerful blow on hard rock, may not do comparatively as good work in soft or seamy ground, while a test of its percussive capacity would have led to declare it efficient.

The pull and the twisting moment can be estimated from the air pressure, the size of the piston and the pitch of the rifle bar, but the result of this computation may be of little use to determine the actual working value of a rock drill.

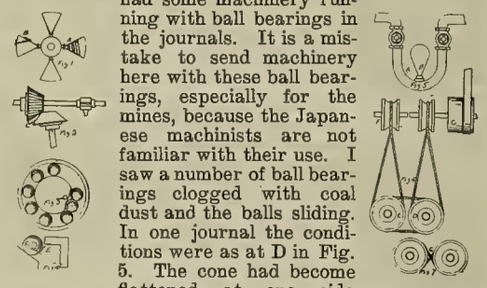
In my opinion, precise methods of investigation, which have been so fruitful of valuable results in the case of steam and internal combustion engines, would not be warranted in the case of rock drills.

NEW YORK CAPITALISTS are said to be considering a proposition to utilize the Colorado river in Arizona and California to develop electric power. It is claimed that many times the quantity developed at Niagara can be readily had.

THE Montana Supreme Court has decided that the Legislature exceeded its constitutional powers in changing the name of Deer Lodge county, in which Anaconda is situated, to Daly county. The old name is restored.

Exporting Machinery.

TO THE EDITOR:—Shippers of mining apparatus to Japan often wonder why the machinery has failed to give the same good results obtained in America. I have lately visited the coal and other mines of Japan and found some reasons for the poor work of imported mechanical devices. In the first place the mining machinery which is exported to Japan is not always properly boxed. It must be remembered that while the steamers are en route on the ocean even the boxed parts of delicate mechanical devices may become broken. It is not unusual to have several pieces in a case break while in transit, and it is always difficult to replace those parts. Figure 1 shows the patched blades of a fan wheel for ventilating purposes which arrived here from a foreign point recently. One blade was snapped off at B and the repair had to be made in the manner shown. Again the blade A was fractured, and had to be patched with strips of sheet metal. These pieces caused the wheel to be unbalanced and it ran in a wobbly condition, which was rectified in part by weighting up the other blades. But it is not always bad packing that cause the breakages and poor adjustments of mining machinery in Japanese mines. I saw a crushing machine, in which one of the main shafts carrying a beveled gear was so far out of line with the meshing gear as to cause the two gears to operate with an interval as at C, Fig. 2, causing the cogs to miss and strip. The Japanese mining engineers and machinists are, as a rule, industrious and capable, but they fail to appreciate the necessity of correct setting of parts of machinery with which they are not perfectly familiar. There is not an abundance of machinery in the Japanese mines, but I visited those near Nagasaki which supply coal to the shipping and found quite a good proportion of modern mining mechanical devices. In one mine they had some machinery running with ball bearings in the journals. It is a mistake to send machinery here with these ball bearings, especially for the mines, because the Japanese machinists are not familiar with their use. I saw a number of ball bearings clogged with coal dust and the balls sliding. In one journal the conditions were as at D in Fig. 5. The cone had become flattened at one side through wear and the steel balls lodged, causing friction and bad service. Plain bearings are the best for mining machinery for this country. In another case I found that the line of balls were set so as to ride on the point of the cup, like F, Fig. 4, instead of E, as should be. This trouble was overcome by setting the cone in the right position, but often the mining engineers do not take the trouble to do this and they let the thing run until too late. The first thing you know a complete new journal is needed. Complicated machinery is not the only difficulty with which the Japanese mining engineers have to contend. They often receive outfits of piping for water, steam or oils which have to be overhauled. For example, in one mine the pipe fitters are required to put an air bell or dome in a pipe, A, Fig. 5, and they chose the point at B. This caused the pipe to choke frequently and there was much trouble with it until the dome was removed and placed upon one of the horizontal lines of the main, instead of in the drop.



Power and transmission machinery is being put into many of the mines of Japan. In Fig. 6 is one way in which I saw a rope drive installed. The main driver is the belt wheel C. A rope drops from a grooved pulley on the same shaft to D, thence to E, going up to F, thus transmitting the power from one shaft to the other and causing the second shaft to revolve in a direction opposite to that of the first. The trouble was that in the short connection to D the rope kept slipping and wearing, as no effective grip could be secured. This trouble was finally done away with by increasing the distance from one to the other. I saw a number of rope drives arranged like that in Fig. 7, showing that the Japanese engineers lack judgment as to the capabilities of a rope drive. The crossing at G is so short that the rope cannot run well. Unless very tight it would slip. This defect was also overcome by putting the wheels about 12 feet apart. There is a very excellent field in Japan for the sale of mining machinery and power and transmission machinery for mines. Conveying machinery, mining pumps, elevating devices, mining tools and belting are all in demand and good prices are being obtained from sales. There are a few agencies in such places as Nagasaki, but lines of machinery and mining supplies carried in stock are very limited, so that many of the Japanese mining engineers try to get along with homemade apparatus. I have seen Japan made power generating devices from overshot water wheels to steam power contrivances. I saw one steam wheel affair in which powerful jets of steam were discharged against a propeller arrangement so as to produce good and steady power, but the wastage of steam was enormous.

NAGASAKI CORRESPONDENT.

Clifton-Morenci District, Arizona.

[STAFF CORRESPONDENCE.]

The Arizona & New Mexico Railroad, whose line extends from Lordsburg, N. M., to Clifton, Ariz., a distance of 71 miles, is being widened to standard gauge, and in the mountainous section is being straightened by several tunnels and open cuts. For a distance of about 50 miles this line stretches along the Gila valley, leaving it at Coronado, a point about 15 miles southeast of Clifton. Near Coronado the San Francisco river flows into the Gila; a few miles farther west Eagle river empties into the Gila. Clifton is situate on the San Francisco, which flows a good volume of water most of the year. Eagle river furnishes the water supply for Morenci, the latter town being about half way between the San Francisco and the Eagle, 6 miles west of Clifton and 2500 feet higher in altitude. There is a pumping plant on the Eagle, which forces water through 6 miles of pipe to Morenci, raising it 1500 feet in that distance. A water tunnel is being cut to the Eagle river so as to get a 90-foot fall. Here water wheels will be put in to operate pumps and electric generators.

Between the Eagle on the west and the San Francisco on the east is the well-explored mineral belt of the Clifton-Morenci district, which is approximately 10 miles north and south by 5 miles east and west. On the west this belt is bounded by granite, it being noted that a well defined north-south shoot of ore is next to a granite foot wall. The country rocks that bound the belt on the east are syenite, lime and quartzite. The mineral belt itself is largely porphyritic in character, there being a great dike of that material trending north and south through the district, but the formation has been much broken and displaced near the surface. The ores, which occur in great masses in some localities and in extensive shoots in others, are sulphides and carbonates. The workings on the various groups get into the sulphides at from 300 to 350 feet depth, though on one group they were not struck till the depth of 500 feet was reached. The major part of development and production has been confined to the central zone of the great belt, extending from a point south of Morenci to a point north of Metcalf.

As is generally known, the great operators of the district thus far have been the Arizona Copper Co., with offices, smelters and concentrators at Clifton, and the Detroit Copper Co., whose offices, smelter and concentrating plant are at Morenci. Near the latter place the mineral holdings of the two companies adjoin and interlock, their underground workings coming together at various points.

At Clifton is the outlet of Chase creek into the 'Frisco river. That creek marks the course of a great erosion which cuts through the mineral belt from northwest to southeast. On both sides of the creek are exposed the ledges of oxidized ores and shoots of green copper carbonates, showing more ore in sight than miners are accustomed to seeing. The Arizona Copper Co. operate a 30-inch gauge railroad in this gulch from Clifton to Metcalf, a distance of 9 miles, by which supplies are hauled up to the mines and the ore transported to the smelter and mills at Clifton. At a point 5 miles above Clifton a 2200-foot incline tram car line connects the railroad with the mines of this company near Morenci. The incline stands at an angle of about 26°, the cars being operated by gravity. Near Metcalf the same company operates two other mines—one on each side of Chase gulch—the tunnels and open cuts through which they are worked being several hundred feet above the bottom of the gulch. They are reached by incline tram lines. It is understood that the Arizona Copper Co. controls a large part of the holdings on both sides of Chase gulch from Metcalf down.

The present smelting equipment of the Arizona Copper Co. will soon be supplanted by a new, modern plant. Supt. George Fraser states that the removal of the old plant and the installation of the new one will require only about five weeks' time. The new plant will comprise five 200-ton furnaces, built in sections, 4x21 feet in dimensions, the idea being that any section may be removed and repaired and replaced without long interfering with the work. It will include three stands of converters, each with capacity to turn out thirty-five tons of copper per day. The flue chamber, for arresting the dust from the furnaces, will be 60 feet long, 30 feet wide and 20 feet high, and will have an outlet through 480 feet of incline tunnel and a 280-foot stack. The ore bins are being rebuilt, with capacity for storage of one month's supply of coke. Besides the large concentrating plant adjacent to the smelter, a 300-ton concentrator is being erected at their mines near the head of the main incline. The slag from the new smelter, instead of being handled by slag cars, as now, will be carried away through a flume of water.

The Detroit Copper Co., the principal stockholders in which are the same as those who control the Copper Queen at Bisbee, operate a large smelter, with converters, and a 500-ton concentrator at Morenci. This concern has just completed a 36-inch gauge railroad from Morenci to Guthrie, 18 miles distant, where it connects with the Arizona & New Mexico road. The new line follows down Morenci canyon, making four complete loops over high trestles. The Detroit concentrator, in charge of G. E. Hunt, has crushers, trommels, thirty-two jigs, two Bryan grinders, two sets high-speed rolls, twenty-eight belt concentrators, five Bartlett tables, numerous hydraulic classifiers and settlers—all operated by three gas engines. From 450 to 500 tons of ore are milled daily. It is delivered to the crushing floor by belt conveyors. The jig product is divided into seven grades, which include over 70% of the mill savings. The table products grade all the way from very coarse and heavy to the lightest slimes. The water used in the mill is economized, and a small saving of values made by a system of classifiers and settlers devised by Supt. Hunt. The system consists of eight redwood tanks, 10 feet diameter and 18 feet deep, each having a tube about 1 foot in diameter that stands in the center of the tank, the lower end being a foot or two above the bottom of the tank. The upper end of this tube, which is even with the top of the tank, receives the tailings from the jigs and tables, discharging same at the bottom of the tank. As the tank is thus kept full of water, the sand and slimes settle at the bottom, the tolerably clear water constantly overflowing at the top is carried to the mill for use again. The slimes from these tanks are concentrated a second time. The mill concentrates for February, 1901, produced 288 tons of copper, the ores having run about 4.20% copper. The ores concentrated are largely sulphides, very siliceous and carry some aluminum. Considerable amount of copper is also saved by precipitating that in solution by scrap iron.

The Shannon group of about sixty claims belongs to the Shannon Copper Co., composed largely of New York, Connecticut, Montana and Arizona people, P. Wiseman being manager. Their group covers the principal portion of Black mountain, near Metcalf. This mountain stands between Chase and King gulches and is covered by a capping of iron hematite, with shoots of copper carbonates, below which appear to be three parallel ledges, trending north and south, and separated by parallel bodies of porphyry. These three ledges—described as the east, west and center—range from 50 to 100 feet wide, carrying copper sulphides and carbonates, with considerable black oxides. The carbonates here are not much decomposed, as in many places, but are firm and hard. At various depths there are found masses of cuprite and occasionally copper glance. Much of the ore here appears to be unusually high grade. The property has a large amount of development, consisting of a number of tunnels which cut through the mountain; some of them are crosscuts and others follow the trend of the ore bodies. The lowest tunnel cuts through the mountain 350 feet below the surface, all the tunnels being connected by winzes and upraises. At the surface there is much open-cut work. In many places the ore quarried out runs 45% iron and 6% to 10% copper. A shipment of 1000 tons from an open cut ran 10% to 15% copper. The porphyry horses, which separate the main ledges, carry some copper. This company recently bonded an adjoining group of eleven claims, for which it is said they will pay $750,000 to the A. C. Co. The Shannon people have commenced the erection of a 300-ton smelter at a point a few miles north of Clifton and are building a railroad spur to it.

The purchase of about eighty copper claims near Clifton by the General Electric Co. was noted in this paper in a recent issue. It may be further stated that the territory purchased lies in the vicinity of Metcalf, along through the northern section of the known copper district. It is reasonably assumed that this important purchase will be followed by development, equipment and production.

A considerable amount of other development is in progress in the district, much of it of an important character. Among the interests included may be mentioned the Copper King, Sterling, Homestake, Medlar and Standard. In the Greenlee district, 8 to 10 miles north of Clifton, is a different formation, bearing gold quartz. Parties headed by Col. Dunham have bonded a group in that section and are preparing for development.

Such men as Prof. Wm. Church, W. A. Farish, John Langton, Prof. Marsh and G. S. Pitcairne were recently in the Clifton-Morenci district reporting on various properties, and this affords some idea of the quiet but systematic attention the district is receiving. WASCOTT.

Clifton, March 28.

World's Record is Claimed.

Idaho Springs can claim a world's record on tunnel driving. In March, with one shift on the drills, the Newhouse tunnel was driven 255 feet. This is probably the best record ever made in similar rock. Under the present system employed in the Newhouse, the record has been nearly reached several times, but the work accomplished last month easily takes it.

The tunnel is now in over 2 miles and the air is so pure that the light entering the entrance to the tunnel can be seen from the breast, although the aperture looks to be about the size of a nickel from that distance. The enthusiastic mining men challenge the word to equal the record made last month, in which one shift at the drills penetrated 7 feet more than an average of 8 feet per day in drilling a 12x12 bore.—Georgetown, Colo., Courier.

Operative Conditions of Gas Engines.

While the technical side of the gas engine and its defects as a converter of heat into work have been pointed out and its weaknesses as a machine have been made known, there is one particular of great interest, both to user and manufacturer, which is not so much discussed—and that is the man who runs it. There is not a gas engine in use that is not mistakenly blamed at some time for things that belong to the engineer, and yet do not come from him directly.

The knowledge of how to handle steam engines is nearly universal in this country. It is hard to find a community where there is not some one who understands the conditions necessary in order to have a steam engine run; not always under the best conditions for efficiency, perhaps, but still run and do its work. The gas engine, as a machine, is far simpler and easier to manage than a steam engine, including the boiler; but it should be distinctly borne in mind that, while the conditions under which a gas engine will run are simpler, they are also more imperative.

To explain by an illustration: To start a steam engine, the boiler must have its proper supply of water, the fire must be built, steam raised, the engine crank must be put in proper position, the cylinder cocks opened and the steam turned on. The last act does not call for any nicety of manipulation. More or less steam, so that there is enough to start, only means faster or slower motion, and not a failure of the whole attempt. With a gas engine, if it uses a tube ignition, the gas is lighted to heat it, the engine is set in position to draw in its first charge, the valve or valves are opened to admit the charge, the motions necessary to draw in and then to fire the charge are gone through, and the engine starts. To have the engine start, though, requires close attention to some apparently simple things.

The tube must be hot enough. The engine must be set right to have the functions come in their proper order. The right amount of gas and of air must be turned on, and a certain amount of energy must be imparted to the wheels. A failure in any one of these means a failure to start. The third particular is the one that most frequently gives trouble—that is, not getting the gas and air turned on in the proper proportions, and nearly always the gas is in excess. Lack of proper understanding of this one point has given more trouble to gas engine users than all other causes combined, except natural neglect. It cannot be too constantly borne in mind that gas engines, so called, are gas and air engines, and that the air is just as essential to their operation as the gas; and, also, that more gas does not mean more power, but often much less. Air is cheaper than gas, and it pays to use all of it that the gas needs; better have a surplus of air than a surplus of gas—better for the engine and better for the pocketbook. If a man gets the idea firmly fixed in his mind that, to run a gas engine, he must get the charge in, keep it in and explode it, and that the charge must be of a proper proportion, he need have very little trouble, outside of actual breakage, in running an engine.

Some judgment in setting is necessary to get the mixture right, and, if a man does not clearly understand what he is trying, it is not as readily done as if he does. Gas, being always under some pressure, comes in whenever a valve is opened, the air only when there is some diminution of pressure within. The slower an engine is turned the less gas should be turned on, as it has more time to get in and crowd out air. The lighter the atmosphere the less gas should be turned on; and, more important still, is it to remember that if not enough gas is turned on, repeated trying to start tends to correct this, and finally enough will be gotten in; but, if too much is turned on, increasing effort only makes the matter worse, and the engine cannot start until this surplus gas is gotten rid of. This can be easily done by shutting off the gas and turning the engine, as in starting, thus pumping out the surplus gas. Caution should be used, as when enough has been gotten out the charge will explode. When this happens the engine is ready to make a fresh start.

Anyone that can do a little thinking, that can keep his eyes open, and who is careful, can run a gas engine. In the hands of a careless man it is safer to have in a neighborhood than a steam boiler is; but it will refuse to run for trifles that a steam engine would not mind, and, to run its best, it must be humored in its peculiarities.—Condensed from Am. Machinist.

THE New Jersey Appellate Court holds that it must be clearly shown that the value of property proposed to be bought by the directors of a corporation is at least reasonably near the price to be paid, and that the action of the directors is subject to review at the instance of any stockholder who considers himself aggrieved; also that the mere fact that two-thirds of the directors and stockholders voted for the purchase cannot prevent its review.

ON the island of Etorpu, which is situated midway between the northern end of Japan and the southern part of Kamtschatka, an extensive sulphur district has been opened up. The island is volcanic, and the deposits occur in circles round extinct and still active volcanoes. The tram plant has a capacity of 3000 tons a day. The beds are being worked by a Japanese syndicate.

The Late Richard P. Rothwell.

Richard P. Rothwell, editor of the Engineering and Mining Journal of New York, died at his home in that city on April 18th. He was the organizer of the American Institute of Mining Engineers at Wilkesbarre, Pa., in 1871, was president of it in 1882, and at various times held other office in it. In 1890 he had charge in the taking of the eleventh United States census of the collection of statistics of gold and silver mining. He was widely known as a successful mining and metallurgical engineer, and had very high rank in technical literature and as a statistician of mines and mining. In the last he has left behind him imperishable work in his annual publications of "Mineral Industry," the statistics of production not alone of the United States but of the world.

Flow of Water in Pipes.

The resistance to the flow of water through pipes may be considered as made up of two parts: (1) A loss of energy resulting from eddies produced in the water by irregularities in the inner surface of the pipe; (2) that due to friction of the water on the inner surface of the pipe.

Until recently the former, though taken account of by experimental coefficients, has been practically neglected as a cause of loss of head. When water flows through a pipe with a rough inner surface, a disturbance is caused in the stream of water, which may extend entirely through the mass, and it is the internal work of friction resulting from these eddies that constitutes by far the larger part of the total energy consumed in the flow. With a very rough inner surface, such as a riveted steel pipe, almost the entire loss of head is chargeable to internal friction due to eddies.

The relative importance of the two factors causing loss of head depends much upon the velocity of flow and diameter of pipe, as well as upon the roughness of the inner surface. For low velocities and small diameters the resistance is largely due to friction on the inner surface of the pipe, and varies closely with the velocity; but at ordinary and high velocities it is largely due to internal friction, and varies nearly with the square of the velocity. These relations, however, are much influenced by the roughness of the inner surface of the pipe.

Owing to the variation in the general law, due to the variation in conditions, as already noted, it is impossible to derive a formula which will apply to all cases. The best that can be done is to select a form of expression which will approximately represent the law for the flow of water through clean wrought-iron and cast-iron pipes, and then to make use of coefficients by which the results of experiments may be conveniently expressed and utilized. The approximate law commonly used is that the loss of head varies as the square of the velocity, with the length of pipe and inversely with the diameter, or,

$$h = f \frac{l}{d} \frac{v^2}{2g},$$

in which v = velocity; h = loss of head; f = friction factor; l = length of pipe; d = diameter; g = acceleration due to gravity.

Tables giving values of (f) in this expression, for smooth cast-iron pipes, may be found in works on hydraulics. In practice, the use of a coefficient (f) is somewhat inconvenient. A simpler and more commonly used form of expression, modified from the above, is the Chezy formula:

$$v = c\sqrt{r\,s};$$

in which r = hydraulic mean radius; s = hydraulic slope $\frac{h}{l}$; and c = a coefficient.—Clinton B. Stewart in Engineering News.

Refining of Petroleum.

Census Bulletin No. 61, just published, gives for the year 1899 the statistics of the petroleum refining industry. Edw. W. Parker of the United States Geological Survey was the special agent who prepared the report.

From the figures given it appears that the capital (representing physical properties) employed in the industry in sixty-seven establishments was:

In land	$ 8,166,032
Buildings	6,502,182
Machinery, tools and implements	39,565,389
Live capital	41,094,289
Total	$95,327,892

The costs of materials used in the manufacture:

Crude petroleum (52,011,005 barrels)	$ 80,424,207
Fuel	3,120,441
Acids	1,735,782
Packages bought, barrels, tin cans and cases.	2,930,805
Coopers', carpenters' and tinners' materials.	8,220,928
Mill supplies	228,926
All other materials	3,300,851
Freight	2,897,401
Total	$102,859,341
Total wages paid to 12,199 workers	6,717,087
Miscellaneous expenses	3,330,851
Total all costs	$112,907,279

The values of the several products at the refineries were:

Burning oils	$ 82,244,961
Residuum	688,455
Paraffine oils	3,987,037
Paraffine wax	7,791,149
Reduced oils	7,108,168
Naphtha and gasoline	15,991,742
Neutral filtered oils	2,256,626
All other products	3,861,246
Total	$123,929,384

Of the total quantity of the refined oils produced 40% was exported.

The Mechanic of the Future.

The consensus of opinion among intelligent foreign observers of our industrial situation is that a large proportion of the extraordinary advance in American industrial activity has been due to the character of the worker in our shops and factories. The American mechanic has for a long time stood as a type of what is best in his line, and to-day probably there are no better workers, no more skillful and efficient operatives, in the world than we have at our command in the great shops and industrial enterprises of the United States. These men are the result of a system which unconsciously has produced a type of operative greatly superior to any other that has yet appeared. The system of apprenticeship and direct instruction in the shops, combined with free education and a sufficient wage to enable the laboring man to enjoy the benefits of culture and recreation elsewhere denied him, have worked together to the production of the superior product known as the American mechanic. The question now is, How shall we best educate the rising generation to take the place of those who are our industrial bulwark to-day?

The apprentice system is practically dead, and so far nothing seems to have appeared that can fully take its place. Schools of technology are giving the young men graduating from them a certain foundation of knowledge which may be in the future beneficial to them. But the requirements of our shops are not to be satisfied by the graduates of schools of handicraft and technology. What the shop wants is experienced men, and the main question is, Where can the man get the experience before he comes to the shop to sell it?

One thing is very certain, and that is that he can not get the experience that is necessary to him in the school. With the proper opportunity to put into practice his knowledge after leaving school, he will become in a few years a mechanic of the very best and highest type; but without this opportunity—and too often poverty prevents the seizing it—he is of little value when he first comes seeking employment. It would be a crime were the American mechanic to be allowed to become extinct. Yet to the studious observer it is evident that nothing short of extinction menaces him in the industrial situation as we see it to-day. This unfortunate condition is by no means the result of any premeditated plan, but is the outgrowth of conditions which have been brought about in the effort to better the condition of working men by both men and employers. In opposing the policy of employing apprentices the labor unions have not looked far into the future, but have struck a mortal blow at the industries upon which the descendants of the members must live.

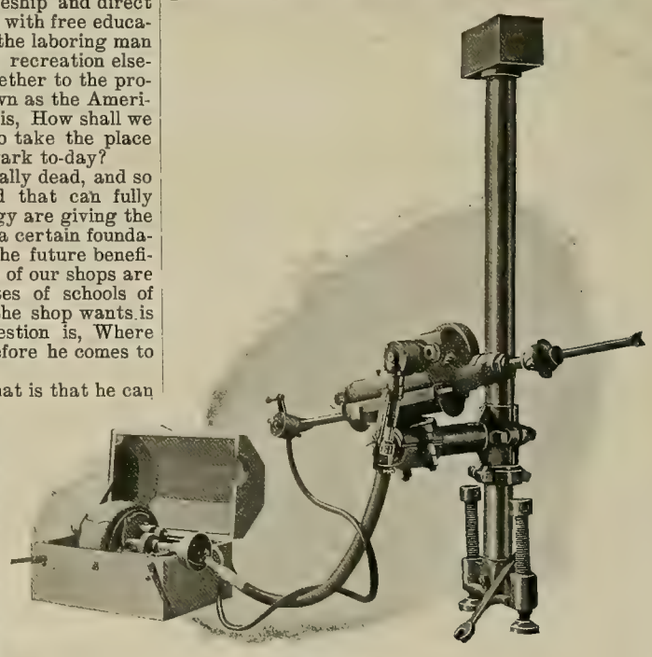
No doubt by this time the error of this point of view has become widely recognized, and it is likely that if manufacturers should take some definite step toward introducing the apprentice system largely again, and providing in some way for the instruction both in handicrafts and in the studies pursued generally in schools of a sufficient number of boys and young men, the result would be admirable, and the fine race of mechanics that has distinguished this country would flourish rather than fall into the decline preceding extinction. We have only to look across the Atlantic at England to see the condition here referred to in a little further stage of development. The picture is by no means a pleasing one, and it seems time for the manufacturers in this country to act in order that their future salvation may be secured.—Condensed from Electric Review.

The Durkee Drill.

The air drill in general use in mines, while a very satisfactory machine as regards the work which it does, is sometimes of low efficiency, some claiming that not more than one-tenth of the power of the steam in the cylinder of the compressor is delivered upon the rock at the bottom of the drill hole. This is not always chargeable to the air drill in itself, but sometimes to the entire group of machinery through which the air drill is driven. As an instance, the air-compressing cylinders are water jacketed to carry away the heat of compression of the air, which heat is essential when the air is expanded if the air is to develop a fair proportion of the power expended in its compression. This is but one of the unavoidable losses due to the system of rock drilling by compressed air.

The air drill has been in use so long a time that the mechanical defects are in the main eliminated. The accessories have also undergone as rapid improvements as to the air drill proper.

On account of the low efficiency of the air drill and its consequent high cost of installation and of fuel for operation, considerable study is given the subject of more economical rock drilling. One of the results of this study is the Durkee lightning drill, recently placed on the market by the Mine & Smelter Supply Co. of Denver, Colo. The Durkee drill, as herewith illustrated, is operated by a small electric motor through a flexible shaft, and, the manufacturers say, uses but 1¼ H. P. at the motor to work a 2½-inch air drill, the idea being to follow as far as possible the best practice as established by the air drill, using the same style of column, arm, clamp, guide shell and feeding device, chuck and rotating devices. The method of application of the power to the bit is, of necessity, entirely different from the air drill. The rotary motion of the motor is transmitted through a flexible shaft to a crank shaft in the drill, which oscillates a heavy bell crank in such a manner that the piston rod carrying the bit is given a quick motion toward the rock, while the return stroke is much slower and of increased power. This is designed to give a sharp blow to the rock and a strong pull to release the drill from a rifled hole. The power is delivered to the piston rod through buffer springs which springs, however, are not required to deliver the blow by their expansion. Attention has been paid to simplicity and ease of repair; any part can be taken out and replaced without removing the dril from the column.



The Durkee Drill.

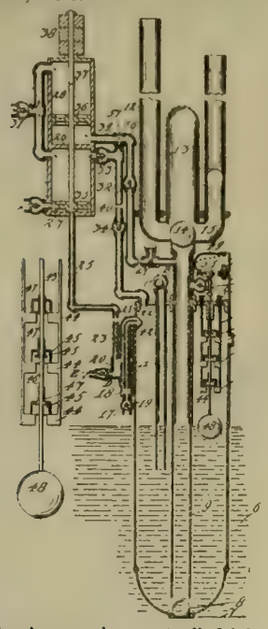
The Mine & Smelter Supply Co., who are agents for the Durkee drill, have tested it in actual mine work and assert that the results are entirely satisfactory. They say that the drills are now running in mines in Colorado, Utah, Arizona, Idaho and other States, and in all cases the reports are most favorable.

Mining and Metallurgical Patents.

Patents Issued April 9, 1901.

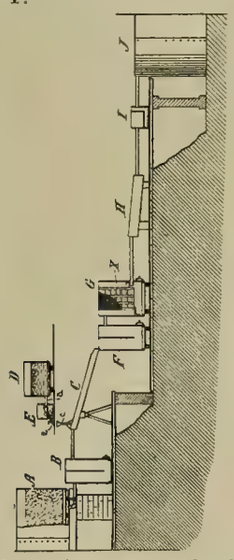
Specially Prepared for the MINING AND SCIENTIFIC PRESS

MEANS FOR RAISING WATER.—No. 671,600; J. Kurtz, Denver, Colo.



Chamber having a valve-controlled inlet opening in lower portion, a discharge conduit 9, whose lower extremity is open and located in lower part of chamber, a second chamber having a valve-controlled opening with which the upper extremity of conduit communicates, one or more discharge pipes leading upward from second chamber, a cylinder divided into two compartments, a piston stem arranged to slide in chamber, a weight attached to stem above cylinder, two pistons attached to stem and located in respective cylinder compartments; a conduit connecting two compartments and having valve-controlled air inlet, a pipe leading from upper part of conduit 9 to upper compartment of cylinder, below piston therein, a check valve located in said pipe and arranged to allow air to pass from conduit to cylinder compartment, another pipe connecting upper part of first-named chamber with the other cylinder compartment above its piston, a check valve located therein to allow the air to pass from cylinder compartment to chamber, an atomizing apparatus connected with an explosive liquid source, a pipe leading from bottom of lowermost cylinder compartment to the atomizing apparatus, which is also connected with first-named chamber, and means for igniting explosive substance within chamber.

PROCESS OF TREATING ORES CONTAINING SILVER, OR SILVER AND GOLD.—No. 671,704; E. D. Kendall, Brooklyn, N. Y.

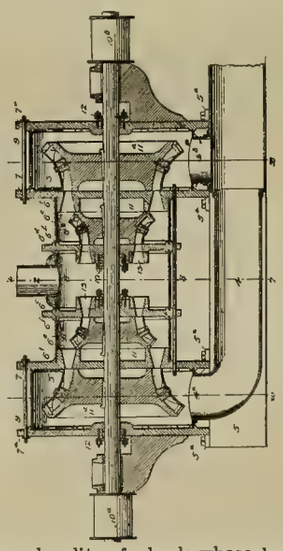


Process of treating orés or other bodies for extraction of precious metals, which consists in treating them with a suitable chemical solution containing a thiocyanate and a cyanide capable of dissolving silver or silver and gold, and in then treating the so dissolved silver by a suitable sulphide, such as potassium sulphide, and in so regulating the amount of sulphide to silver as that they shall substantially equalize each other, in separating the sulphur sulphide, and in returning thiocyanate and cyanide into subsequent operations for further treatment of the ore.

MINING MACHINE.—No. 671,818; C. E. Davis, Chicago, Ill.

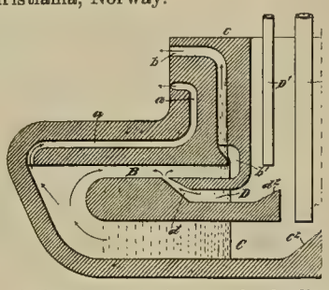
A stationary frame upon which operating mechanism is supported, and having at rear end one or more downwardly projecting shoes or supports, a roller associated with each of said shoes or supports and mounted on frame, said roller or rollers adapted to engage a supporting piece placed beneath shoe, so as to allow machine to be moved laterally, a holding-jack connected with rod passing through enlarged opening or openings in frame, rod so positioned as to be opposed to roller or rollers, the openings through which rod passes of such size that rod engages roller or rollers when jack is in its operative position and locks roller or rollers from rotation.

TURBINE.—No. 671,885; A. Hendry, Fayetteville, Ark.



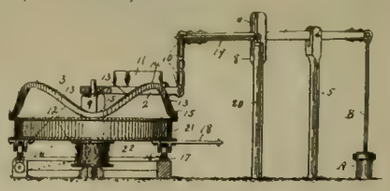
A series or plurality of wheels whose buckets have a general outward inclination or curvature with inner and outer walls parallel to each other, and side walls having transverse spirality or curvature, and diverging outward, a series of steam chambers and exhaust steam chambers, with suitable outlets, and steam chutes receiving steam from one steam chamber and delivering it to one wheel, second wheel receiving steam discharged from latter wheel and discharging it into an exhaust steam chamber.

ORE SEPARATOR.—No. 671,573; F. H. A. Wielgolaski, Christiania, Norway.



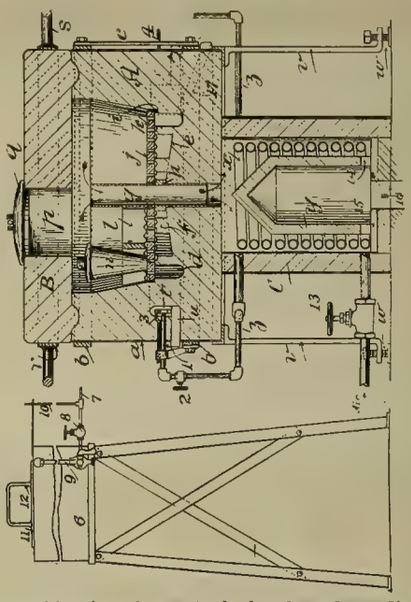
In a centrifugal machine, means for feeding a washing fluid from center, a chamber provided with reverse branch passages, a passage conducting liquid into one reverse passage in a direction opposite to flow of washing fluid therein and means for feeding material to be separated.

DRIVING DEVICE FOR PUMPS.—No. 671,468; C H. Clayton, Limestone, N. Y.



A pumping and lifting machine comprising a reciprocally movable pump rod, a walking beam having one end connected to rod and other end weighted, a turntable provided with a series of cam faces arranged one in advance of the other and a non-revoluble rock arm pivotally supported at one end and having its other end supported by the cam faces and connected to the weighted end of the walking beam for transmitting motion thereto.

ASSAY FURNACE.—No. 671,558; D. Laird, Forfar, Scotland.



In combination of a central chamber, flame-directing ribs projecting from hearth, flame passages leading into chamber tangentially, a vapor burner at end of passages, a pipe feeding air to burner, having a coil intermediate of its ends, a supplemental chamber inclosing pipe, a core in chamber having conical top, lid for closing main chamber and a pipe having its inlet in upper part of main chamber, pipe discharging above apex of top of core.

METHOD OF MAKING CYANIDES.—No. 671,479; J. Grossmann, Manchester, England.

The process for the manufacture of ferro-cyanides consisting in passing ammonia gas over a mixture of carbonaceous matter and a sulphide of an alkali at a temperature of from 700° to 800° C., and adding to products of reaction suitable iron compounds for converting the cyanides first formed into ferro-cyanides.

The New East River Bridge.

The contract for the new East river bridge at New York was awarded to the John A. Roebling's Sons Co. several months ago, and the preparation of plans and other work has since then been under the supervision of Charles G. Roebling, the president, who is assisted by William Hildenbrand.

On April 7th the first public step of importance in the construction was taken. The work done then was the placing in position of the 2¼″ diameter ropes which support the temporary foot bridges on which the workmen will stand during the main work of cable laying. Several methods of getting the first line across have been employed in the past, and kites, swimmers and other means have been tried, but the method employed on this occasion is a distinct advance over all previous ones. One shore end having been made fast, the drum containing the cable was carried across the river on a float and the cable payed out, allowing it to rest on the river bed until it could be conveniently raised from the water and to the desired height by means of a stationary engine and drum. This was done successfully on April 11th, the time required being only seven minutes, navigation being suspended during that period.

THE utilization of peat on an enormous scale is proposed in north Germany, where it is said a quantity of peat equivalent to 300,000,000 tons of coal is available. The plan is to use the peat as fuel at the place where it is found for conversion into electric power, which would be distributed to manufacturing centers.

MINING SUMMARY.

Specially compiled and reported for the MINING AND SCIENTIFIC PRESS.

ALASKA.

Judge Brown has ordered the removal of the office of Recorder from Wrangel to Ketchikan, the latter place being much the more important commercially and the center of a rapidly developing mining district.

From Nome comes the report that gravel taken out from beneath the ice is yielding 30 cents to the pan.

A placer strike on the upper Pelly river is reported from Selkirk.

Finney & Wiley, at Porcupine, are putting in hydraulic machinery.——Dewechter & Gasman are installing a hydraulic plant.——On discovery, owned by Jack Dalton, considerable development is projected. A plant costing $6000 has been set up and is ready for operation.

ARIZONA.

COCHISE COUNTY.

E. B. Gage, a large owner of Tombstone mines, says he has succeeded in getting all the Tombstone companies to unwater and reopen their mines, after working a year on the project together with Frank M. Murphy, president of the Santa Fe, Prescott & Phœnix Railroad.

The Easter Sunday M. Co. have bonded mines near Bisbee for one year to A. M. Tong and associates at $250,000. Men will be put to work on it at once.

GILA COUNTY.

A 19-foot ledge of ore is reported found in the Star Light mine, near San Carlos. Thirty men are employed and considerable ore shipped. The owners, it is said, will erect smelting works at the mines. Contracts have been let for running 150 feet of tunnel; W. J. Nicholson is Supt.

The last Congress segregated a small tract of land, the site of an old mine, from the San Carlos Indian reservation. A shipment of ore made from claims on the tract is said to have returned $85 a ton.

MARICOPA COUNTY.

Moore & Koon's claims have been bonded for $5000 by J. K. Truman, who has begun work on the property. It is understood that a 10-stamp mill will be built.

PINAL COUNTY.

A custom reduction works for Red Rock is said to be under favorable consideration.

YAVAPAI COUNTY.

A power plant is projected on Fossil creek, to be used by mines of Jerome, Prescott and Phœnix. The creek fall is represented to be 1500 feet in 12 miles and the electric power will have to be transmitted 40 miles to Jerome, 50 miles to Phœnix and 70 miles to Prescott.

CALIFORNIA.

ALAMEDA COUNTY.

The Sunset G. Dredging Co. has incorporated, with W. H. Weilbe, Adolph Uhl, C. J. Schuler and L. Golly of Oakland and A. W. Bell of San Francisco as directors.

AMADOR COUNTY.

The Lincoln Co. have had their bond extended until 1906. They have considered that greater depth was necessary for proper development of the mine. On the 1200 level no showing of particular value appears. The shaft is being repaired and it is intended to go down 600 or 800 feet deeper.

The strike in the 2300 level of the Kennedy mine, Sutter Creek, is proving more extensive as developed. An 80-foot ledge, all good milling ore, is said to be uncovered. Some very rich ore is found in the hanging wall. On the incline the depth of this find is 2700 feet.

Sixty stamps are crushing ore taken from the 2000-foot up to the 1700-foot levels at the Oneida mine, Sutter Creek.

The Bunker Hill shaft, at Amador City, is cleaned out and repaired and sinking has commenced from the 800 level; C. R. Downs is Supt.

On the Shenandoah mine, near Plymouth, Supt. Thornton says he will sink a three-compartment main working shaft for the mine. He estimates a loss of $7 to the ton on rock so far milled and is undecided whether to try the cyanide process or not. He claims between 20,000 and 30,000 tons of ore blocked out in the mine.

The Centennial Co. at Drytown has decided to put in new and heavier machinery during the summer.

EL DORADO COUNTY.

At the Mt. Pleasant mine, at Grizzly Flat, a 4-foot ledge has been found at a depth of 47 feet and specimen gold quartz in the 850 level of the reopened old workings.

W. & C. Toombs, at White Rock, have struck the old channel in a tunnel.

KERN COUNTY.

New concentrators are to be added to the Garlock mill.

Sampling works at Randsburg are now completed.

The Santa Fe Reduction Co., at Ludlow, will move twenty stamps from the Barstow mill to that place, if prospecting develops water to run them.

Goldsmith & Robb are operating the Winnie mine. They intend sinking from 170-foot level to 300-foot level. A crushing of eight tons returned $40 per ton.

MADERA COUNTY.

A hoist and pumping plant for the Common Gold mine, near Coarse Gold, have been recently constructed; A. H. G. Palmer is Supt.

The Waterloo development work consists of a 200-foot and 300-foot shafts, the plant of two 85 H. P. boilers, two hoists, mill of ten 1000-pound stamps, two concentrators and a giant duplex compressor, which pumps and ventilates the mine. The company is spending about $4000 per month.

NEVADA COUNTY.

The Mountaineer M. & M. Co. have leased to J. J. Sloat of Hamilton, Ohio, the Mountaineer mine, at Grass Valley, for two years, with purchase option at $50,000. The lessee is to spend $15,000 in development work; W. A. Dennis is Supt.

At the Allison Ranch mine the ledge is being prospected on several levels and sinking from the 1300-foot station is to be resumed. The company propose to replace their direct water power plant with electric power, and may substitute an electric hoist for the steam now used.

The Central M. Co., Grass Valley, at the annual meeting elected C. E. Clinch president and treasurer and J. M. Wiley secretary.

Four Grass Valley mines have been bonded by representatives of Senator W. A. Clark of Montana. The claims bonded are the Vulcan, Irish-American, Ford & Smith and Bob Smith, lying between Massachusetts Hill and the North Star mine. A plant of electrical machinery will be put in and a new shaft 500 feet deep will be sunk.

The Penn Con. M. Co. is suing the Grass Valley Ex. Co. for $600,000 damages for ore taken from ledges claimed to be the property of the Penn Co. at Grass Valley, but which has been mined in by the Grass Valley Co. for the last two years. It is a question of the determination of the situs of the apex of the lode. The case is now on trial in the U. S. Circuit Court at San Francisco.

The Sierrra Electric Co. has incorporated, to manufacture and sell electric power in Nevada City; the plant will be at the Plumbago mine, Sierra county; the directors are F. Searles, R. C. Walrath, W. W. Waggoner, H. B. Budd and M. W. Mather of Nevada City.

A ledge 2 feet wide of ore estimated to go $75 a ton has been discovered in the Lecompton mine at Nevada City. A new double-compartment shaft is being sunk and the new stamp mill is about completed.

PLUMAS COUNTY.

The Club and Star quartz claims at Quincy have been bought by Eastern parties, through their agent, Mr. Lamoureaux of Oakland. The purchasers are said to intend to erect a small mill.

It is reported that J. D. Williams & Co. will build a smelter in Genesee valley.

SHASTA COUNTY.

W. Peterson is hydraulic mining on Dry creek, near Igo, working in a 10-foot bank of gravel.

Capt. J. R. De Lamar has bonded the Michigan group of seven partially developed copper claims, adjoining the Bully Hill claims, it is said, for a short term and at about $50,000. The Michigan vein is believed to dip into the Bully Hill ground, and by the extension of the Bully Hill tunnels 400 feet it would be cut 800 feet deep.

A. J. Wright, superintendent of the Josephine mine, near Redding, reports that the shaft is now down over 100 feet.

B. H. Wilsee and T. G. Harrison have a working bond at $6000 on the Golden Star quartz mine, near Buckeye.

It is said that a new process of roasting the copper ores at Keswick was to be employed, by which the sulphur fumes would be done away with.

F. Stabel and H. W. Weldon have bonded a group of copper claims in the Backbone district from J. Gesford.

SIERRA COUNTY.

At the Oriental, near Alleghany, the owners propose tunneling to tap the ledge and reopen the old shaft. H. S. Johnston is Supt.

SISKIYOU COUNTY.

The O. & C. shaft in bottom of lower tunnel is being sunk 100 feet deeper and on high-grade ore; G. B. Goodell is Supt.

In the Hungry Creek district, the Sterling and Blue Jay quartz mines have started with full crews. A new tramway is being put in on the Blue Jay and the Sterling mill is being overhauled; C. R. Wiegel is Supt.

H. Espee, who has commenced hydraulicking on Beaver creek, says he has a big supply of water this year and expects a good clean-up.

The Jillson & La Flesh mills, at Henley, are running steadily.

Hornbrook, April 15.

Saderfield & Tracy of Cecilville are said to have bonded a copper ledge on the South Fork of the Salmon to San Francisco people for $6000.

J. O. Welsh of Mott says a trial run of the 5-stamp mill on his mine on French creek was successful. He intends adding concentrators and more stamps.

TRINITY COUNTY.

W. W. Ellis recently bought the Kise place, near Lewiston, and is installing a mill on it to crush cemented gold-bearing gravel.

J. B. Layman & Sons, Hay Fork, milled twenty-seven tons of ore from their mine with satisfactory results.——M. B. Parlin is working the Drinkwater placer mine. ——J. Jackson is working a 12-foot ledge of copper ore on Carrier Gulch.

The Trinity G. P. M. Syndicate, Ltd., W. Maitland manager, working the Nash mine, is preparing to work a second channel. At present sluicing is employed, but hydraulicking is to be substituted.

The Trinity Copper Co. have contracted for the construction of 5 miles of wagon road from Kennett west to the Shasta King mine. F. Lawry of Sacramento has the contract. The company is said to intend putting in a 250-ton smelter at the mine.

The Sweepstake mine at Weaverville, F. Hall manager, has been connected with Weaverville by telephone. The five months' development work to date is said to open up a large body of gravel, all carrying pay. The tunnels have not bottomed the channel, and it is expected another will have to be run lower. So far as developed, the gravel is over 1000 feet wide and over 500 feet deep. The company will build a ditch from Canyon creek to get a water supply for hydraulicking.

Mining land on East Fork of the Trinity river, from Van Matre's ranch to the Unity Co.'s ground, has been bonded for dredging.

TUOLUMNE COUNTY.

The Sunset mine, on Knight's creek, is bonded to Howe & Harmon at $4500, $1000 paid down and balance to be paid within six months. When bonded the original locator had performed only ten days' work in an open cut. Since then the bonders have commenced sinking and at 12 feet are said to have ore assaying $40 to the ton.

The Phillips group, between Turnback creek and Tuolumne river, are being developed in tunnel No. 2. now in 200 feet. A company is now forming which proposes to buy the mine and put in a 300 H. P. turbine on the Tuolumne river.

The Snell group is bonded to an English syndicate at $38,000. The claims are 15 miles northeast of Columbia, in American Camp district.

The Harvard Co., at Columbia, has put men in the stope and is unwatering the mine. The mill is to start with twenty stamps.

COLORADO.

ARAPAHOE COUNTY.

Mine owners largely interested in Leadville and Cripple Creek mines are said to be organizing to build a large smelter at Denver, so as to be independent of the American S. & R. Co.

BOULDER COUNTY.

The Ramona M. Co., owning the Rough Rider and Little Giant lodes at Wall Street, have commenced a shaft, to go down 200 feet.

CHAFFEE COUNTY.

A new district is reported opening up at Turrett, on the west end of Whitehorn district, near Salida. The strike was made on the 400-foot level of the Vivandiere, and the vein is said to be 11 feet wide, with an 8-inch streak running $1 to the pound. The ore is similar to that of the Little Johnnie at Leadville, and the formation between lime and quartzite is similar. It is reported that in the sulphides there are 3 feet of ore running $100 to the ton.

CLEAR CREEK COUNTY.

A tunnel on the Mammoth, J. M. McMichael manager, is said to have opened up a rich ore body.

DOLORES COUNTY.

Dr. Campbell, who has a bond on the Atlantic Cable group, at Rico, is operating a small mill on the ore and says it makes a satisfactory separation of the zinc from the iron and lead, the zinc produced carrying 50% to 60% zinc. This result is obtained by magnetic separators and tables.

Rico, April 12.

FREMONT COUNTY.

E. F. Gropello, chemist in charge of the Dorcas mill at Florence, reports the cyanide department of that mill in good working order, and that the pneumatic cyanide process, which has been adopted there, is proving satisfactory and effective. He reports the tailings as running an average of 60 cents per ton and says some runs have been as low as 20 cents.

Florence, April 9.

GILPIN COUNTY.

The Ophir-Burroughs pool are sinking a shaft at Central City and employing about forty men, including tributers. A. Waters is Supt.

GUNNISON COUNTY.

The California-Colorado M., M. & S. Co. is operating the Ruby Chief, at Irwin; W. A. Welsh, Supt.

JEFFERSON COUNTY.

The smelter now building at Golden is to be, when completed as planned, the largest in Colorado, capacity 1200 to 1500 tons of ore each twenty-four hours. The capacity at the start will be 300 tons, with one furnace of the four projected. May 1 the smelter is expected to blow in. Over 5000 tons of ore are now in the yard. The Clear Creek M. &. R. Co., R. F. Carpenter manager, owning the smelter, has contracted for 500 acres of mineral land in Clear Creek district and projects a 5000-foot tunnel and a 2700-foot shaft, the first improvements to be made.

LAKE COUNTY.

President J. A. Heimbaugh of the Fanny Rawlins, Leadville, reports that in the South Winnie shaft there is 6 feet of ore, averaging $50 a ton, and 3 feet averaging $25 a ton, with no walls in sight.——A furnace is to be added to the Boston G. S. Co. plant, Leadville. It will be a reverberatory of fifty-ton capacity.——The Ella Beeler and Clear Grit have started up. Four men are getting the workings in shape and extensive developments are planned.

The Reno M. Co., at Leadville, H. Collings manager, is putting in station and sinking pumps. The shaft is now 350 feet deep and some sulphide contact is showing in the bottom. From the First National, adjoining the Reno, regular shipments of good grade sulphide are made and the ore shoot in that mine is believed to extend into the Reno.

Manager J. A. Shinn of the Nayr M. Co., Leadville, reports that the shaft on the White Cap claim is down 600 feet, the last 200 feet being in blue limestone. Some 300 tons of $10 ore is shipped monthly. This output pays about half operating expenses, and much of it comes from filling of old stopes too low grade to pay in early day mining.

MINERAL COUNTY.

The American Sulphur & M. Co. has incorporated with capital stock $18,000, to operate sulphur beds on Trout creek, near Creede. The sulphur beds have been known for a long time. Mr. Barrie and H. G. Pierce, of New York, have organized the company as a preliminary step, and in the event that the purchase of the deposit is concluded it will establish works for the treatment and refining of the sulphur and for the manufacture of sulphuric acid.

OURAY COUNTY.

It is reported that the Camp Bird mine is under bond again to same people as before and at the same price.

SAGUACHE COUNTY.

The Banner tunnel, near Crestone, driven on the vein, is now showing the latter to be 5 feet between walls, with 18 inches to 2 feet of pay ore, a honeycombed quartz carrying gold and some copper.

SAN JUAN COUNTY.

The Aztec G. M. & M. Co. has bought a large group of claims in the Needle Mountain district, Silverton; J. Moore, manager.——Near the Aztec Co., E. Liston is working eight claims, which have produced five cars of ore that returned from $300 to $400 per ton.——J. H. Sloan has leased the Missouri claim in Boulder gulch. ——Manager W. A. Ptolemy of the San Juan M. & D. Co. is operating on Hazelton mountain. The Blackberry vein, lately cut 670 feet in the tunnel, has opened up into ore varying from 18 to 24 inches in width.

SAN MIGUEL COUNTY.

The Alta Mines Co. have incorporated; capital stock, $2,500,000; directors, W. J. Leudke, D. M. Sneddon and A. Thierbach. The incorporation is to operate the Alta mine at Telluride.

The Keystone placer, at Telluride, is being prepared for the summer's work, sixty to eighty men being employed in building the flume, installing machinery and generally cleaning up.

The Alta mine, in Alta basin, near Tel-

luride, is shipping to the smelters four cars of ore per month that runs $700 to $800 per ton in gold, silver and lead. The mill ore is being kept on the dump. The work here shows an ore shoot 1200 feet long.

The Japan Mines Co., tunneling to crosscut the three veins opened in the upper workings, are in 250 feet and expect to cut the ore bodies at 2700 feet—750 feet lower than the old tunnel. The ore shoots here are opened 2000 feet in length. The Japan mill, shut down during the winter, will now be started.

The Contention group, up Bear creek, has been sold by Scott, Haskins, Hockley and others to the Smuggler-Union Co. at a figure from $100,000 to $150,000. The new owners are expected to build a tramway to the Smuggler-Union mills at Pandora, to which ten stamps have been recently added.

Work on the Meldrum tunnel, which starts above Pandora and runs toward Red mountain, has been under management of A. Meldrum.

Telluride, April 12.

SAN MIGUEL COUNTY.

The Peck cyanide plant, Telluride, will start up as soon as tailings are thawed sufficiently to handle. They can treat 200 tons per day until the fall freeze comes. ——On the Silver Bell, at Ophir Loop, twenty-five men are doing development work, and are obtaining regular shipments of first-class ore and a steady accumulation of second-class for the new mill.

SUMMIT CONNTY.

The reorganization of the North American G. D. Co. at Breckenridge was made last week. The company is incorporated under Maine laws, capitalization $500,000; incorporators, C. A. Hight, H. P. Sweetser, Portland, Maine, E. C. Ramsdell, J. D. Upton, Boston.

TELLER COUNTY.

The Monument G. M. Co., Cripple Creek, has decided to increase its capital from $300,000 to $1,000,000. The increase of capital will be used to buy more mining property.——The Damon Co., Cripple Creek, has opened ore in the second level resembling chimneys which have heretofore been found in the mine.——Work on the Trail claim of the Battle Mountain Co., Cripple Creek, has opened the junction of two veins, showing 4 feet of ore, assaying from $10.40 to $53 per ton The main workings of the Moon-Anchor, Victor, have been leased, and sinking will be started at 750 feet and continued to 1000 feet. Good ore is in sight in existing levels from veins coming from the Temomj and Midget.——G. W. Wilson, leasing in the Mabel M., Victor, will soon install a hoist, the recent work disclosing the top of an ore shoot. The Cyanide Leaing Co., operating several blocks of the Anaconda Co., Cripple Creek, have shipped eleven tons of ore that will go about seventeen ounces gold to the ton. The ore was taken from the main tunnel level of the Anaconda and up toward the surface. For the control of the lease $20,000 is said to have been paid. The Anaconda Co. is working 100 feet below the tunnel level underneath the Cyanide L. Co.'s ground, to cut the same ore shoot.

A. C. Dake of Denver obtained a five-year bond on the main workings of the Rigi group, adjoining the Portland, Cripple Creek. A contract for an additional 400 feet of sinking in the shaft has been let.——The Golden Cycle M. Co., Cripple Creek, propose to construct a spur track from the railroad to the mine, estimated to cost $25,000. The mine is producing eighty-three tons daily.——The shoot worked by Stumpf, Allison & Meyer, on the Whisper ground of the Gold Sovereign, Victor, dips into the Dante, and is now being drifted to from three levels of the Whisper shaft.——The president of the Doctor-Jack Pot Co., Cripple Creek, states that it has $121,000 cash in treasury and 600 tons ore not yet sold, one car of which is estimated to contain $18,000. This came from the vein in the twelfth level, where there is 4 feet of ore, with a rich streak yielding twenty-five tons monthly, going about $700 a ton. The net earnings for the first three months of the company's existence were $400,000.

The Last Dollar G. M. Co., at Cripple Creek, are reported as intending to buy and install a compressor and drilling plant to cost between $30,000 and $40,000, to be used in exploring the mine below the 1050-foot level.

The Independence Con. Co. is considering thirty applications for leases and will probably grant a few. L. Reynolds of Leadville has a two years' lease on blocks 5 and 6.

IDAHO.

ADA COUNTY.

Supt. Wyman of the Checkmate mine, Pearl, says that free gold ore was found in the lowest workings; $4500 was taken out last month. From nine to twelve carloads of concentrates a month was being shipped, the ore concentrating to one-sixth.

BLAINE COUNTY.

The Crœsus, the Hope, the Deadwood, the Big Camas, the Camas No. 2, at Hailey, are bonded.——The Liberal and the Maggie May group are reported as intending to build a 20-stamp mill.

CUSTER COUNTY.

L. Green, manager of the Clayton Smelting Co.'s plant at Clayton, will start the smelter soon.

IDAHO COUNTY.

It is reported that the Dewey, near Grangeville, will soon have a mill and cyanide plant. Mr. Jacobs, treasurer of the company, says that assays have averaged $84 across the ledge, the ore being 10 feet wide.

Colonel F. Danford says a rich strike has been made in the McKinley, in the Simpson district. The new tunnel crosscuts the lege at 70 feet, showing free gold ore 3 feet wide. The mine is owned by Wardner people. G. W. Lucy, of Wardner, is superintendent.

KOOTENAI COUNTY.

A dredging company is building a dredger to rework the tailings of the old placer mines on Santa creek, 25 miles east of Tekoa, Wash.

Rich placer diggings are reported as discovered on Santa creek, about 25 miles east of Tekoa, Wash. Men are rushing in from Tekoa, Farmington and other points in the Paloose country. The Tyson Bros. are said to have taken out $308 in coarse gold from a piece of ground 40x15 feet. The new camp is on a divide between the old Hoodoo and Cœur d'Alenes.

LATAH COUNTY.

Placer discoveries are reported on Meadow creek, at the head of Potlatch river, about 15 miles south of Santa. The discovery is on lands opened for entry last fall, and largely filed on by homesteaders.

NEZ PERCES COUNTY.

The superintendent of the placer mines at Salem Bar, near Lewiston, reports that the company is handling 600 yards of gravel daily, which prospects 50 cents a yard.

OWYHEE COUNTY.

The Blaine mill of the Trade Dollar Con. M. Co., at Silver City, is now operated by electrical power from Swain Falls on the Snake river.

SHOSHONE COUNTY.

The Terrible-Edith group at Murray have been bonded to H. McFadden, it is said on account of Senator Clark and his brother.——The Mullan M. Co. have the tunnel in 750 feet and will continue development work.——B. N. Hillard, for the Murray Development Co., has made a payment on the bond of the Oro Fino group at Murray.

Governor Hunt of Idaho has proclaimed the abolishment of martial law in Shoshone county.

MONTANA.

The Sapphire Mines Syndicate has resumed work on their mines at Yoga. They propose to sink several shafts on the lead and work from as many points, in order to increase the output.

BEAVERHEAD COUNTY.

The Greenwood M. & M. Co., operating a concentrator at Melrose, have purchased the right for Beaverhead county to use the pneumatic cyanide process and are erecting a 150-ton cyanide plant at the property for the purpose of treating the table tailings. The Colorado Iron Works of Denver, Colo., have the contract to construct the plant.

Melrose, April 10.

GALLATIN COUNTY.

O. P. Chisholm, who has bought the Moline mines, has bought a 10-stamp mill. He says the ore will run from $10 to $40 gold per ton.

LEWIS AND CLARKE COUNTY.

C. Warfield, agent for F. A. Heinze, has let a contract to H. R. Davies to sink the shaft on the Heinze property in Kenwood 100 feet deeper, the work to be completed in sixty days. The cost will be about $3500 for this 100 feet, the first 100 feet costing about $2000.

LIVINGSTON COUNTY.

J. M. McNulty, manager of the Montana-Milwaukee-Natural Bridge M. Co. at Contact, says the 10-stamp mill will be immediately freighted to the mines and that another aerial tramway will be erected. This will carry ore from the Imogene claim.

PARK COUNTY.

C. E. Elkin of St. John, N. C., has taken an option on the Bear Gulch mines at Jardine for $1,100,000. The company has 450 feet of tunnel, cutting a vein with a 20-foot wide ore shoot averaging $15 in gold, and another vein 28 feet wide averaging about $15. A second tunnel, in 500 feet, cuts four veins showing high-grade ore.

SILVER BOW COUNTY.

A. H. Wethey, general manger of Senator Clark's Montana mines, states that after May 1st the matte produced by the Butte Reduction Works will be treated at the smelter of the Amalgamated C. M. Co., instead of being shipped to the smelter of the Montana Ore Purchasing Co. at Anaconda. The amount of matte the latter have been treating has averaged 2,000,000 pounds monthly.

The Home Copper M. Co., bonding the Giantess group at Newmanville, is pushing development. A 40-foot drift on the lead at the 100-foot level shows 20 inches of ore the entire distance. Machinery is being put in to sink 400 feet. Sisley & Davidson of Butte are in charge of operations.

The syndicate, F. Farrell manager, which recently bought the Murray placer at Butte, for which it is said $1,000,000 is to be paid, is sinking a shaft on the ground about 150 feet east of the drift of the Silver Bow No. 3. It is claimed this drift is in Murray ground and in a large body of rich ore from 5 to 15 feet wide.

The formal announcement is made in Boston that the Boston & Montana C. & S. M. Co., the Butte & Boston M. Co. and the Amalgamated C. Co. will consolidate. The directors of the two first named companies recommend the deposit of stock preliminary to arranging the consolidation which is to be accomplished by exchanging for stock of the Amalgamatep Co. on an agreed basis. The arrangement is to be completed between the 25th of April and the 2nd of May, othewiser the stock will be returned.

Part of the Pennsylvania mine has been closed down by an injunction granted the Montana Ore Purchasing Co., and 250 miners had to be laid off. The action is part of the litigation going on between the Heinze people and the Amalgamated C. Co.

NEVADA.

ESMERALDA COUNTY.

J. L. Butler, the discoverer of Tonapah, says it is situated on the western foothills of the San Antonia range, on the east side of Montgomery district. The ledges run nearly east and west and have large black croppings that can be easily seen for a distance of at least 10 miles. The ore is in mineralized porphyry and the veins are from 1 to 4 feet wide. For years people have passed over these croppings and either took no samples or concluded there were too much of them to contain any great value. He made three trips there before he thought it worth while to make any locations. In the latter part of August, 1900, he visited the place, did some prospecting and brought away some samples of ore. The samples assayed 666 ounces silver and $140 gold. He then returned, accompanied by Messrs. Oddie and Brougher, and eight claims were located, which are now known as the Butler Group. When he began to stake off the ground he found ore everywhere. The character of the rock is free-milling, and along the entire length of the ledges for several thousand feet pay ore is to be found.

Up-to-date, Tonapah contains two stores, three assay offices, three hay yards or corrals, four saloons, two chop houses and one photograph gallery. As yet only about a dozen frame buildings have been erected, but at least eighty tents have been pitched.

G. D. Burton, president of the Electric M. & R. Co. of Reno, has bought four mining claims 12 miles southeast of Hawthorne. A large lead was discovered several years ago, but little prospecting done on it; Portions of the lead assay from $14 up. Mr. Burton has formed a company of Boston capitalists and development work will begin at once.

J. A. Brent and W. C. Price are reported to have bought the eight principal mines of Tonapah district for $350,000. The new owners propose to erect a reduction works as near the mines as fuel and water can be procured. The exact location is not yet determined.

ORMSBY COUNTY.

A sampling works is projected for Carson City.

WASHOE COUNTY.

Kearney & Effricks' clean-up of 100 tons of gravel milled at the Slip at Olinghouse yielded $6.50 per ton. The channel has been crosscut in pay 40 feet, with 3 feet depth. A tunnel is being run in the channel.

WHITE PINE COUNTY.

P. C. Weber, manager Sapho Co. at Ely, states that the main vein had been reached with the tunnel, the ore having all the appearance of carrying good values.

NEW MEXICO.

BERNALILLO COUNTY.

The mill of the Cochiti G. M. & M. Co., near Bland, is running about 6300 tons of ore per month. It is reported that by the adoption of the pneumatic cyanide process the slimes, with which they formerly had trouble, are being successfully cyanided, the saving amounting to 90% and the cost 60% lower than before.

Bland, April 10.

GRANT COUNTY.

The Modoc and a group of adjoining claims at Tierro are reported sold to C. T. Grayson of Silver City and G. Kingdom of Tierro for a large sum.

J. P. Olympius of Denver, Colo., one of the owners of the Lucero copper mines, near Mora, reports that the workings are in good ore, and that the company will sink a 1000-foot shaft and put in a smelter later.

The development of the Golden Era and building of its reduction plant are advanced sufficiently to anticipate starting the mill by April 25. Later an aerial tramway is proposed to connect the mine and mill.

The Clear Lake M. Co. of Carlisle, A. W. Tennant manager, has temporarily suspended operations to install a cyanide plant.—— A strike is reported by the Steeple Rock Development Co. on property operated under lease. A stringer of high-grade gold ore is shown by assay returns to go $4 to $5 per pound.——The lease at Santa Rita of Mariano Isles has been secured by Riney, Herbert and L. B. Robinson, Bartlett and Winslow. The new leasers are putting up a steam hoist to sink the shaft 250 feet before crosscutting.

OREGON.

BAKER COUNTY.

The Crystal Palace M. Co., near Sparta, will erect a 20-stamp mill.

A. G. Lohmyre, an owner in the Buckeye mine, a new discovery near North Powder, says ore from 50-foot level is rich in gold, copper and silver.

In the Concord the big Blaine ledge is reported in the crosscut tunnel. The pay shoot is over 3 feet wide, and Pres. J. H. Robbins states that assays from the face average $41.244, running from $17 to $195. This mine is located next to the Red Boy, and the ledge cut is one of the Red Boy ledges, being thrown on the Concord by a large porphyry dyke that crosses it.

GRANT COUNTY.

The Cougar mine, near Granite, is reported sold to Eastern people at a high figure. It has a 250-ton cyanide plant and $100,000 expended in underground development.——The Magnolia is bonded to an English company.——The Climax group is bonded to C. L. Aldrin and men have been put on development work.

The Buffalo is drifting on a 24-foot ledge, 4 feet of which goes high in free gold; 2000 feet of development work has been done. It is owned by Portland people. R. E. L.

Granite, April 15.

JOSEPHINE COUNTY.

A rich quartz find is reported on Josephine creek, 3 miles from Kerby. The ledge so far uncovered is between 4 and 6 feet wide and is exposed in the steep banks of Josephine creek. The whole face of the ledge is stated to be a network of gold seams. Six pounds of the rock pulverized and panned out yielded $56.——J. T. Hagan has put a whim at the shaft on Fort Lane ledge which is now down 110 feet, and proposes sinking 100 feet deeper. The last 55 feet of this shaft is said to have produced $80 a foot at $12 per foot cost for the work.

SOUTH DAKOTA.

PENNINGTON COUNTY.

The Golden Summit mine has been leased for three years to a Mr. Beaver of Cedar Rapids, Ia. The mine is said to have produced $60,000 in early days.

The Harrison mine, in the North Lead district, has paid to date about $75,000 dividends out of a production of about $150,000 gold. The underground workings are close to the surface, the ore lying is two flat shoots, which is said to average $80 per ton. The intention is to erect a cyanide plant soon to treat large ore bodies of low grade. The mine is a producer of wolfram ore, there being about 100 tons now on the dump.

The American M. Co. have drifted from the shaft on Spearfish creek toward Ragged Top and have been bonding claims adjoining. The price to be paid is $250 per acre, which makes about $5000 per claim.

UTAH.

Liquid asphaltum is a late discovery reported by Indians on the Uncompahgre reservation. It is said to be valuable for the manufacture of gilsonite and ozokerite.

BEAVER COUNTY.

The suit for the Burning Moscow mine,

near Milford, has been decided in favor of M. T. Cullen, who states that he will resume its operation. There is said to be $5000 value of ore on the dump.

BOX ELDER COUNTY.

The Globe M. Co. has incorporated to operate the Buckhorne and other claims in Park Valley district. The officers are F. Eberhardt, president; J. Marley, secretary, Salt Lake City.

JUAB COUNTY.

The Star Con. M. Co., Tintic, at the annual meeting, have made M. Packard president and C. F. Packard superintendent. The annual report showed $68,000 receipts from sale of ore, debts paid $35,-184 and cash balance $5000. The company propose to send their low-grade ore, going $12 to $17 to the ton, to the Bingham Co.'s smelting plant.

At 2000 feet depth in the Mammoth, at Tintic, ore has been struck going $36 per ton in gold, with some copper and eight ounces silver. The strike was made, so Pres. S. McIntyre states, 300 feet north of the winze dropped down from the 1900-foot level.

N. N. Brown has sold the Bertha in West Tintic to F. Earls and a syndicate of Eastern investors for $25,000, $1000 dollars down, balance within a year.

SALT LAKE COUNTY.

It is said that the Utah Consolidated Co., or Highland Boy, of Bingham net earnings for the quarter ending March 31st were $360,000. The smelter now treats 500 tons daily and forwards 1,000,-000 pounds of bullion per month to the refinery.

The Black Bess M. Co. has incorporated; J. W. Langley, treasurer and secretary, Salt Lake City. The company owns the Stanley, Oregon and a portion of the Black Bess mining claim in Big Cottonwood mining district.

At the Ben Butler M. Co. annual meeting A. L. Jacobs was elected president and J. A. Jacobson superintendent of the mine at Bingham.

The Tintic M. & D. Co., G. H. Robinson, manager, has bought the Yampa group, at Bingham, for $130,000 cash and 50,000 shares of stock. A compressor plant is being put on the mine.

The Deer Creek M. Co. has incorporated with a capital stock of $1,000,000. W. H. H. King is president; J. B. Welmer, secretary and treasurer, Salt Lake City. The company will operate the Ohio group in Gold Mountain mining district.

The Highland Boy smelter, at Bingham, is turning out every twenty-four hours nearly 40,000 pounds of bullion. The eight McDougal roasters, three reverberatory furnaces and at least two of the set of converters are in operation, with an average consumption of 525 tons of ore.

SUMMIT COUNTY.

At the Daly-West, Park City, the incline below the 1400-foot level is down 255 feet—all in ore of excellent quality. Superintendent J. A. Kirby says the record for March was an output of 2800 tons of "shipping ore" and concentrates.

WASHINGTON.

FERRY COUNTY.

It is reported that the Brooklyn Copper-Gold M. Co., near Keller, have found the ledge widening from 2 to 6 feet and assaying $24 a ton. Supt. G. F. Redner states that the tunnel will cut the other two ledges on the mine at depths from 400 to 600 feet.

At Republic the Princess Maud's north drift is in 150 feet. The ore looks better and it is believed a rich pay shoot has been entered.

The Flag Hill Co., Republic, are sinking a winze 140 feet north of the tunnel.

It is authoritatively stated that the Zala M. at Republic has been bonded to an English syndicate for $1,000,000. The new owners will resume development on it and also on the Kitty Clyde, adjoining. They will put in a plant to treat the ore at the mine.

High-grade ore has been struck in the Republic above the 400-foot level. The average is said to be $128 per ton. Manager Leckie says a few small specimens of copper minerals have been found in the lower workings.

OKANOGAN COUNTY.

W. Schmitz, manager of the Bright Spot mine at Weheville, says the shaft is down 30 feet in ore.

It is reported that the Golden Zone at Loomis, C. E. Meskimen manager, will put in an air compressor plant on the mine.

SNOHOMISH COUNTY.

A shipment of 1400 pounds of copper ore from the North Star Co. at Index gave net returns of $33.——A consolidation of several mines at Index is proposed as the basis for the establishment of a local smelting plant.

YAKIMA COUNTY.

The Swauk placers at Liberty are said to be yielding large nuggets this season, one of $1000 value being found.

WISCONSIN.

BAYFIELD COUNTY.

The Chippewa C. M. Co. of Boston in development work on the Chippewa mine have found rock that runs from $6 to $30 in gold per ton and from 4% to 6% in copper, some silver and nickel—average $20 a ton. The company have done 1200 feet of tunnels and drifts from a shaft down 200 feet, and plan to put on a stamp mill.

WYOMING.

A discovery of rich copper ore is reported in the Horse Creek copper district, 100 miles north of Cheyenne.

ALBANY COUNTY.

The Rambler copper mine, on Douglas creek, is shipping high-grade copper ore regularly.

UINTA COUNTY.

Developments in the lower workings of the Carissa, South Pass, show good ore.——The Rose mine has been bonded to V. Reed of Denver, Colo.

FOREIGN.

BRITISH COLUMBIA.

T. James, Supt. Onondaga M. Co., Rossland, reports that the 10-stamp mill should be ready for operation in a few weeks. In the meanwhile the showing of ore is being increased.

At Kitselass canyon, up the Skeena river from Port Simpson, are a number of quartz claims, some of which are being developed by S. Singlehurst and others of New York. Miners who have been working for them, while prospecting the adjoining district, found a quartz ledge which, the discoverers claim, assays over $1000 to the ton.

A rich strike is reported on the Nettie L., at Lardeau. It consists of an 18-inch streak in a stope showing gray copper in quantity.

The Kootenay Mines shaft is completed to 1200-foot level and drifting on the vein has been commenced. The ledge on this level is about 40 feet wide and has a good-sized pay shoot. The shaft has been in the ledge from the 600-foot tunnel.

The Evening Star, at Rossland, has been temporarily shut down until road admits of hauling ore.

The miners at Rossland have voted down a proposed strike for higher wages.

C. Dempster of Rossland has made a payment on his bond on the Republic group at Slocan.

The Gold Commissioner's office at Dawson estimates the Klondike gold output for 1901 at $25,000,000.

The Cariboo mine, at Camp McKinney, has the pay shoot of ore, milling from $6 to $50 a ton, opened for 1300 feet on the third level. The average width of ore is 4 feet.

The Lake Shore & B. C. C. M. & D. Co. of Chicago have incorporated to operate the J. S. & Blue Bell claims, in the Boundary district. The capital stock is $150,000 and the incorporators are P. Welch, T. J. Ryan, J. Dorsey, J. P. Watt and T. W. Murphey.

The Miner-Graves syndicate intend adding to their plant at Phœnix a forty-drill compressor and a large hoist to work to a depth of 1500 feet, arranging to run either by electricity or steam.

The Wonderful ledge at Sandon is reported to have been found 4 feet wide between well-defined walls. W. W. Warner says when work was started the ledge was only 8 inches wide, and he regards its steady widening as a favorable sign.

CUBA.

The litigation over the Salamon copper mine at Las Minas has been decided favorably to the present holders, G. Salamon and H. H. Reilly of New York. They bought the land, including the mine, in 1899. After expending $30,000 in development other parties claimed possession under an old document, which, according to the decision, did not cover the Salamon mine. Work will be commenced on an extensive scale.

MEXICO.

Reports from the Gold Coin P. & D. Co. of Colorado Springs, Colo., operating in Sonora, state they have bought several claims, on one of which, the Santa Rosa, near San Javier, are five veins from 2 feet to 16 feet in width, carrying high values in silver and gold.

The Sivirijoa M. Co. has incorporated to work a number of claims in Fuerte mining district, Sinaloa. O. R. Nelson, of Chicago, is president and treasurer; P. J. Donohue, of Salt Lake City, general manager. Some of the claims are said to have been operated 100 years ago. Mr. Donohue says his examination indicated 100,000 tons of twenty-ounce silver ore on the dump. The company intends to begin development at once.

Personal.

JESSE SCOBY of Denver, Colo., is in Arizona.

CAREY WRIGHT, of Denver, Colo., is in Montana.

J. H. MINEAR of Ketchikan, Alaska, is in Boston, Mass.

FRED SEARLES, of Nevada City, Cal., is in San Francisco.

MARK B. KERR, of Grass Valley, Cal., is in San Francisco.

A. C. SEIBOTH of Denver, Colo., was recently at Globe, Ariz.

W. M. NESBIT, SR., is now Supt. Snowflake mine, Eureka, Utah.

J. G. MARX has resigned as Supt. Ely M. & M. Co., Ely, Nevada.

W. S. KEYES has returned to San Francisco from Mazatlan, Mex.

V. M. CLEMENT has returned to Salt Lake City, Utah, from Mexico.

J. T. FINLAN of Butte, Mont., is at Grass Valley, Cal., examining mines.

C. GRAHAM has been appointed Supt. Bellfontaine mine, Nevada City, Cal.

J. D. FRESH has been appointed Supt. Ramona mine, Galiban, Sonora, Mex.

F. E. WARE, manager Mount Shasta mine, Shasta, Cal., has gone to Chicago.

J. W. SHARPE, manager Mulatos mine, Sonora, Mexico, is in San Antonio, Texas.

W. MOREHEAD of Virginia City, Nev., is Supt. Yellow Aster mine, Randsburg, Cal.

WM. T. ST. AUBURN, formerly Supt. Gladstone mine, Shasta county, Cal., is in London.

W. H. WASHBURN has been appointed foreman in the Virtue Con. mines, Baker City, Or.

HAROLD T. POWER of the Hidden Treasure mine, Centerville, Cal., is in San Francisco.

M. L. MACDONALD, mining engineer of Butte, Mont., has returned there from New York.

J. MACFARLAND, manager Horseshoe mine, Fay, Nev., has gone to Peru to examine mines.

THOS. GREGORY of Lead, S. D., has been appointed Inspector of Mines of South Dakota.

SUPT. J. P. KEANE of the Cariboo mine, Camp McKinney, B. C., is visiting Spokane, Wash.

J. B. GALLAGHER, manager Daly estate mines at Copperopolis, Mont., is visiting Butte, Mont.

C. DOTY, of Tintic, Utah, has gone to Ely, Nevada, as superintendent of the Ely M. & M. Co.

GEO. BERRIEN, formerly of Bodie, Cal., is now general manager Fisher Creek M. Co., Libby, Mont.

V. S. GARBARINI of Jackson, Cal., has been appointed Supt. Tisdale group, at Snettisham, Alaska.

S. J. SULLIVAN, manager of the Penn M. Co., at Leadville, Colo., has returned there from New York.

A. M. MCDONALD has been appointed superintendent of the App Con. M. Co., Tuolumne county, Cal.

R. T. WHITE, Gen. Supt. Highland Boy smelter, Bingham, Utah, has returned there from New York.

WALLACE DINSMORE, of Marysville, Cal., is mentioned for Debris Commissioner. He is a lawyer and civil engineer.

JAS. C. H. FERGUSON, recently appointed Pacific coast sales agent for the Midvale Steel Co., has returned from Philadelphia to San Francisco.

CAPT. RICHARD MILLET has returned to Salt Lake City, Utah, after several months spent in Australia and New Zealand for British mine owners.

CHAS. S. ROOD, for many years associated with the late Richard C. Chambers, has succeeded him as manager of the Ontario and Daly M. Cos., at Park City, Utah.

Books Received.

"The Geology of the Central Portion of the Isthmus of Panama," by Oscar H. Hershey, is a bulletin recently issued by the University of California. The writer states he found evidences of very recent depression of the sea bordering lands on the Pacific side, and corresponding uplifts in the mountain axis of the isthmus, and notes the similarity of these evidences to similar phenomena on the California coast. For sale by J. C. Rowell, U. C., Berkeley, Cal.; price, 30 cents.

"A Treatise on Electromagnetic Phenomena, and on the Compass and Its Deviations Aboard Ship," Vol. I, by Com. T. A. Lyons, U. S. N., published by John Wiley & Sons, New York, 556 pages, 8vo.; twelve chapters, presenting in clear, readable text, with profuse and comprehensive illustrations, the theoretical part of electromagnetism. The author gives very fully the science as it is known now, showing its relations to light, heat, electricity and chemical action, including much valuable tabled data obtained during the last few years. On a subject rapidly becoming more and more important, even in its mere technical refinements, the publication is up-to-date. Price, $6, post paid.

Commercial Paragraphs.

THE Burt Mfg. Co. of Akron, Ohio, have furnished the Midvale Steel Co., Philadelphia, Pa., with eight Burt exhaust heads in the last four months.

A LOGGING ENGINE, built by the Joshua Hendy Machine Works, San Francisco, weighs fifteen tons and is for the Sanger Lumber Co., Fresno county, Cal. It is capable of winding up 12,000 feet 1-inch steel rope.

D. HUG, manufacturer of the Hug water wheel, Denver, Colo., recently shipped a 3-foot wheel to Chihuahua, Mexico, and a similar one to Mr. Condett at Eureka, Colo., to develop electric power for drills, light and mill work in Picayune gulch.

THE American Bridge Co., through its Minneapolis office, has contracted with the Cananea Con. Copper Co. to furnish the buildings for their new mining plant at La Cananea, Sonora, Mexico. This will require about 350 tons of steel. They will also furnish the steel furnace and converter building for the Mountain C. M. Co. at Keswick, Cal.

THE Manufacturers' Association of Kansas City, Mo., has established a catalogue library, and requests all manufacturers and mercantile establishments to forward their catalogues, receipt of which will be duly acknowledged. Catalogues will be filed and indexed by the card index system, both as to firm name and subject matter of the catalogue.

THE Colorado Iron Works, Denver, Colo., are supplying a 36x192 copper matte furnace for the Clear Creek Reduction Co., whose plant is being erected at Golden, Colo. The equipment includes a Nesmith water evaporizing attachment, sampler, slag trucks and forehearths. The same company are furnishing a copper smelting furnace for the Hoffman Smelting Co. at Marble, Hinsdale county, Colo.; Bartlett tables, Cornish rolls and a reverberatory copper furnace for the Union Copper M. Co. of North Carolina; a 60-ton copper matter furnace for the Copper Crown M. Co. of Pictou, N. S.; two 42x142 lead smelting furnaces, with other equipment, for the Selby Smelting & Lead Co. of San Francisco; a 42x120 lead smelter for a plant in Belgium; also equipment for a stamp mill, with drying, roasting and concentrating machinery, to the San Luis M. Co., Durango, Mexico. They are preparing to operate all the machinery of their own shops by electric power, and are installing a 150 H. P. generator and motors driven by a new 170 H. P. Corliss steam engine.

Recently Declared Mining Dividends.

	Payable.
Ingham Con. G. M. Co., regular monthly ½ cent per share, $3400	April 15
Portland G. M. Co., Colorado, quarterly 3 cents per share	April 15
Golden Eagle M. Co., Colorado, 1 cent per share, $4890	April 15
Vindicator Con. G. M. Co., Colo., regular quarterly 3 cents per share, $33,000	April 26
Butterfly-Terrible, Colo., quarterly ¾ cent per share, $9975	April 27
Montana Ore Purchasing Co., quarterly $1 per share, extra $2 per share, $240,000	April 27
Boston & Montana, Montana, quarterly $5 per share, extra $5 per share	May 20
Gold King, Colo., regular 3 cents per share, $28,105.50	April 20
Gwin M. D. Co., Cal., No. 20, of 15 cents per share, $15,000	April 16

Trade Treatises.

General Catalogue No. 20 of A. T. Ames, superbly illustrated, has been issued, giving sizes, capacities and constructive details relating to the Fulton pump, together with much useful information concerning pumping. The typographic make-up is excellent and in keeping with the high practical value of the catalogue, which can be obtained on application to A. T. Ames, Mfy., Galt, Cal.

Obituary.

WM. E. JOHNSON, under whose management the Florence & Cripple Creek Railroad was projected and built into the Cripple Creek mining district, Colorado, died in St. Paul, Minn., on the 7th inst. He was prominent in mining operations of Colorado and resided in Denver.

Notices of Recent Patents.

Among the patents recently obtained through Dewey, Strong & Co.'s SCIENTIFIC PRESS U. S. and Foreign Patent Agency, the following are worthy of special mention:

MOTOR CARRIAGE.—No. 671,575. April 9, 1901. W. J. Woosley, San Francisco, Cal.

This invention relates to motor carriages. It consists in the mounting of the motor, intermediate and variable driving gears through which motion is transmitted upon the front axle of the vehicle and means by which the motor and associated mechanism are turnable in unison so as to steer the apparatus. It also comprises means for transmitting power directly to the front axle; and means for changing the speed and reversing the mechanism so that it acts as a brake.

GATE.—No. 671,582. April 9. 1901. J. G. Busch, Potter Valley, Cal.

This invention relates to a gate suspended from above so as to swing upwardly, and fulcrumed levers and connections by which it may be opened from either side by the approaching passenger. It also comprises latching devices, and slide rods on the gate for operating the latches and lever connections thereto.

CONVEYOR FOR ROPEWAYS.—No. 671,591. Dated April 9, 1901. A. S. Hallidie, San Francisco, Cal.

This invention relates to a conveyor attachment to be used for aerial wire ropeways, and is designed for the purpose of transporting sugar cane and other material that can be made up into bundles or packages. It comprises slings, a means for connecting the slings with the carrier traveling upon the standing rope, and means for disengaging and delivering the bundle at the end of the journey.

FRUIT GRADER.—No. 671,646. April 9, 1901. R. G. Bailey, San Mateo, Cal.

The object of this invention is to grade or assort globular or similarly shaped fruits into sizes. It consists of a horizontal rotating disk with a rim beveled or sloping from the upper surface downward, and a series of adjustably curved rollers so spaced in relation to the rotating beveled surface as to permit the fruit, approximately globular in shape, to roll off in the proper place. As the rim or disk rotates over an inclined surface, the fruit will travel around the circle until it arrives at a space of sufficient size to allow it to pass while guides direct it to suitable receptacles.

List of U. S. Patents for Pacific Coast Inventors.

REPORTED BY DEWEY, STRONG & CO., PIONEER PATENT SOLICITORS FOR PACIFIC COAST.

FOR THE WEEK ENDING APRIL 9, 1901.

671,646.—FRUIT GRADER—R. G. Bailey, San Mateo, Cal.
671,906.—SOFA BED—C. Buhner, S. F.
671,582.—GATE—J. G. Busch, Potter Valley, Cal.
671,941.—HUSKING PIN—J. P. Flaughter, Ione, Or.
671,591.—ROPEWAY CONVEYOR—M. E. Hallidie, executrix, S. F.
671,592.—WAVE MOTOR—Hamilton, Hollingsworth & Perley, Los Angeles, Cal.
671,727.—WINDOW SCREEN—Hipolito & Masten, Los Angeles, Cal.
671,800.—POLYPHONE—N. Jensen, Eureka, Cal.
671,677.—CULTIVATOR TEETH—J. Killefer, Los Angeles, Cal.
671,601.—HORSE HITCHER—Ida N. Lachner, Baker City, Or.
671,914.—FISHING TACKLE—S. H. Nesbit, Los Angeles, Cal.
671,562.—GLOVE—Neuman & Franklin, S. F.
671,707.—HARVESTER REEL—S. Nixon, Clyde, Wash.
671,942.—LOCK—C. E. Smith, Oroville, Cal.
671,943.—KNOB—C. E. Smith, Oroville, Cal.
671,575.—MOTOR CARRIAGE—W. J. Woosley, S. F.
34,342.—DESIGN—L. W. Brown, Eugene, Or.
34,335.—DESIGN—J. D. Stassart, Portland, Or.

Latest Market Reports.

SAN FRANCISCO, April 18, 1901.

SILVER—Per oz., Troy: London, 27 3/16d (standard ounce, 925 fine); New York, bar silver, 59½c (1000 fine); San Francisco, 59½c; Mexican dollars, 49½c San Francisco, 48c New York.

COPPER.—New York: Lake, 1 to 3 casks, $17.25; carload lots, $17.00; Electrolytic, 1 to 3 casks, $16.75; carload lots, $16.62½; Casting, 1 to 3 casks, $16.75; carload lots, 16.62½. San Francisco: 18. Mill copper plates, 20c; bars, 22@23c. London: £70 3s per ton.

It is said that efforts are being made by the Amalgamated to induce the Rio Tinto to limit production. In the United States the Heintze litigation is accomplishing this result.

LEAD.—New York, $4.37½; Salt Lake City, $4.00; St. Louis, $4.27½; San Francisco $5.00, carload lots; 5½c 1000 to 4000 lbs.; pipe 6¾, sheet 7½, bar 6c; pig, $4.70 @5.10. London, £12 7s 6d per ton=2.78½ cents per lb.

SPELTER. — New York, $4.20; St. Louis, $3.75; London, £16 2s 6d per ton =3.58½ cts. per lb; San Francisco, ton lots, 5½c; 100-lb lots, 6c.

ANTIMONY.—New York, Cookson's, 10c; Hallett's, 9c; San Francisco, 1000-lb lots, 12c; 300 to 500 lbs., 13@14c; 100-lb lots, 15@18c.

IRON.—Pittsburg, Bessemer pig, $17.25; gray forge, $16.50; San Francisco, bar, per lb., 2.65c in small quantities.

STEEL.—Bessemer billets, Pittsburg, $24; open hearth billets, $27.00; San Francisco, bar, 7c to 12c per lb.

TIN.—New York, pig, $26.00; San Francisco, ton lots, 29c; 1000 lbs., 29½c; 500 lbs., 29½c; less, 30c; bar tin, per lb, 35c.

QUICKSILVER. — New York, $51.00 large lots; London, £9 2s 6d; San Francisco, local, $47.00 per flask of 76½ lbs.; Export, $45.00

MAGNESIUM.—New York, $2.90 per lb.; San Francisco, $3.75.

ZINC.—San Francisco, 5½c; slab, 5¾c; bar, 7c; zinc dust, N. Y., 8c.

BABBITT METAL.— San Francisco, No. 1, 10c.

SOLDER. — Half-and-half, 100-lb. lots, 18½c; San Francisco, Plumbers', 100-lb. lots, 15½c.

FERRO-TUNGSTEN. — New York, 37%, 32c; San Francisco, 65c (60%).

NICKEL.—New York, 50@60c per lb.

ASSAY LITHARGE.—San Francisco, 10c per lb, small lots.

BISMUTH.—New York, per lb., $2.25 50-lb lots; San Francisco, $2.50 to $2.75 lb lots.

PLATINUM.—San Francisco, crude, $22 per oz.; New York, $22 per Troy oz

ALUMINUM.—New York, No. 1, 99% pure ingots, 35c; No. 2, 90%, 30c to 35c.

POWDER.—F. o. b. San Francisco: No. 1. 70% nitro-glycerine, per lb., in carload lots, 15½c; less than one ton, 17½c. No. 1*, 60%, carload lots, 13½c; less than one ton, 15½c. No. 1** 50%, carload lots, 11½c; less than one ton, 13½c. No. 2, 40%, carload lots, 10c; less than one ton, 12c. No. 2* 35%, carload lots, 9½c; less than one ton, 11½c. No. 2** 30% carload lots, 9c; less than one ton, 11c. Black blasting powder in carload lots, minimum car 728 kegs, $1.50 per keg; less car lots, $2 per keg.

CAPS.—3x, $5.50 per 1000; 4x, $6.50; 5x, $8; Lion, $9, in lots not less than 1000.

FUSE.—Triple tape, $3.60 per 1000 feet; double tape, $3.00; single tape, $2.65; Hemp, $2.10; Cement No. 2, $3.00; Cement No. 1, $2.65, in lots of 3000 feet and up.

CANDLES.—Granite 6s, 16 oz., 40s., 10¾c per set; 14 oz., 40s., 9¾c.

CHEMICALS.—Cyanide of potassium, 98%-99%, jobbing, 32½@33½c per lb.; carloads, 30@31c; in 10-lb. tins, 40c; sulphuric acid, in carboys, 66% B, 2c per lb.; soda ash, $1.90 per 100 lbs. 58%; hyposulphite of soda, 2¾@3c per lb.; blue vitriol, 5¾@6½c per lb.; borax, concentrated, 7@8c per lb.; chlorate of potash, 12@13c; roll sulphur, 6c; alum, $1.90@2.00; flour sulphur, French, 2¼@2½c; California refined, 1¾@2c; nitric acid, in carboys, 8c per lb.; caustic soda, in drums, 3@4c per lb.; Cal. s. soda, bbls., $1.00; sks, 95c per 100 lbs.; chloride of lime, spot, $2.50@2.60; nitrate of potash, in kegs, 8c; caustic potash, 10c in 40-lb. tins.

OILS.—Linseed, pure, boiled, bbl., 75c; cs., 80c; raw, bbl., 73c; cs., 78c. Deodorized Stove Gasoline, bulk, 14½c; do., cs., 20½c; 86° Gasoline, bulk, 20c; do., cs., 26c; 63° Naphtha or Benzine, deodorized, in bulk, per gal., 13½c; do., in cs., 19½c; Lard Oil, Extra Winter Strained, bbl., 75c; cs., 80c; No. 1 bbl., 50c; cs., 55c. Neatsfoot Oil, coopers' bbls., 60c; cs., 65c; No. 1 bbl., 50@52½c; cs., 55@57½c.

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FOR SALE.

FOR SALE.---1200 feet of 12-in. Steel Pipe, No. 14 gauge, in good condition.

Inquire PORT COSTA WATER CO., 326 California St., San Francisco, Cal.

Valuable Hydraulic Mining Property,

located in Plumas County, Cal., containing 273 acres, title U. S. patent, water rights, ditches, etc., FOR SALE AT A BARGAIN. Terms easy. For further particulars, apply to ALMARIN B. PAUL, 27 Crocker Building, San Francisco, Cal.

FOR SALE.
Gold Dredging Land.

About 100 acres on river in California; few miles from railroad. Nine dredgers making big money in vicinity; other dredgers building. Land estimated to hold $8000 gold dust to acre; 30 feet deep. Bond given. Address Box 40, this office.

FOR SALE.

A Bruckner Roaster, 8'6"x26'6", with fire-box complete; also Chlorinating Barrel, 5'x9'.

Machinery new, never having been set up. Will sell at a discount f. o. b. Denver.

Address Box 949, BOISE, IDAHO.

FOR SALE.
ONE COMPLETE PLACER MINING DREDGE
OF THE ELEVATOR TYPE.

With buckets having capacity of seven and a half cubic feet. Dredge only used few months. Located on Grasshopper creek, near Bannack, Mont. For full particulars, address THE BUCYRUS COMPANY, South Milwaukee, Wis.

THE S. H. SUPPLY CO.,
THE MACHINERY DEPOT OF THE WEST.
22d and Larimer Streets, DENVER, COLO.

We have a 10x12 Lidgerwood Geared Hoist which is in as good condition as new. This is an exceptional bargain. We are offering it at $950. The only objection we have to quoting prices in our advertisements is that a connection might be made between the price and the condition of the machine. This is not the case in this instance. Among the other hoists which we have are:

6x8 Double Friction, New.
10x12 Double Friction.
12x16 Double Drum Geared.
11x15 Double Drum Geared.

We do not buy a boiler until we have the State and city inspection bureaus pass on it and state that they will issue a certificate as to the amount of pressure it will safely carry. This class of boilers, while not as cheap at first cost, are a great deal cheaper than those which you may find after a few weeks' service are condemned boilers. We also think we have the lowest prices on new standard and high pressure Boilers. The ones on hand at present are:

2 100 H. P. Heine Water Tube.
2 80 H. P. Horizontal Tubular.
1 60 H. P. Horizontal Tubular.
2 40 H. P. Horizontal Tubular.
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15, 10, 8 and 6 H. P. Vertical.

Feed Water Pumps and Tank Pumps in every size that is made. We test all our pumps before sending them out. They are all guaranteed to give good service:

12x8½x10 Worthington Duplex.
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Every size and make Boiler Feeds.

You know that we issue a catalogue every two months which can be had for the asking. This gives a good idea of our stock, and all prices are placed at the net prices so that you can tell just what it will cost you.

There is no question about our having the trade on Wrought Iron Pipe and Fittings. Send for quotations. We know that we can sell you pipe at saving over any house in the city. These are new goods.

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ASSAYER, BOOKKEEPER, TYPEWRITER and General Office Man desires a situation. Ten years' practical experience. Best references given. Address A. Sayer, care of Mining and Scientific Press office.

Wanted by Mining Engineer,
experienced in the West, moneyed partner to help form mining development company.
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First-Class Amalgamator
Wants position to take charge of Quartz Mill. Years of experience and best of references. Address H. T., this office.

ASSAYER AND CHEMIST, who understands surveying, desires position with some large mining company. Long experience in a Spanish-speaking country. Thorough knowledge of Spanish. Will start with a small salary where there is a chance for promotion. Address G. F., care of this office.

Engineers, Firemen, Machinists, Electricians:
Send 10 cents for new 40-page pamphlet, containing list of questions asked by examining Board of Engineers. GEO. A. ZELLER, Publisher, St. Louis, Mo.

WANTED.

Wanted, by May 1st, two first-class amalgamators to run a 10-stamp mill; one must be a machinist. Only first-class men with reliable reference need apply. Wages satisfactory to the right men. Camp 35 miles from Rossland and 7 from railroad. Good accommodations. New mill and steady work. Reference: Bank of British North America, Rossland. Address T. JAMES, Supt. Onondaga Mines, Rossland, B. C.

ACUITAPILCO DISTRICT!
Wanted, partner with $10,000 gold for development; can get half interest in gold, silver and lead mines (five). Plenty of concentrating ore averaging 25 ozs. silver to the ton of 2000 lbs.; gold, ¼ oz. Water power and timber close to the mines.
LIC ELIAS GALINDO, P. O. Box 26, Tepic, Mexico.

Bond and Lease Offered.
Will give bond and lease on the Franklin & Union group of two patented claims on Turkey creek, Bradshaw mountains, 20 miles south of Prescott, Arizona. Has 600 feet development work, showing good body of high grade silver ore. Correspondence solicited.
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Ask them for prospectus of
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Right up to date.

Special Meeting.

OXFORD BETA TUNNEL AND MINING Company.—There will be a special meeting of the stockholders of the Oxford Beta Tunnel & Mining Company, to be held at the office of the company, No. 135 Geary St., Room 111, San Francisco, at the hour of 4 o'clock P. M., on the 4th day of June, 1901, for the purpose of increasing the capital stock of the company from twenty-nine hundred shares of the value of one hundred dollars each to one hundred thousand shares of the value of two dollars and fifty cents each. By order of the Board of Trustees. W. H. KNIGHT, Secretary.

Annual Meeting.

The Regular Annual Meeting of the Stockholders of the Gwin Mine Development Company will be held at the office of the Company, Nos. 1208-11 Claus Spreckels Building, San Francisco, California, on TUESDAY, the 23d day of April, 1901, at the hour of 2 o'clock P. M., for the purpose of electing a Board of Directors to serve for the ensuing year, and the transaction of such other business as may come before the Meeting. Transfer Books will close on SATURDAY, the 20th day of April, 1901, at 12 o'clock noon. J. J. CRAWFORD, Secretary.

Office—No. 1209 Claus Spreckels Building, San Francisco, California.

Published Notice of Decrease of Stock.

Notice is hereby given, that a general meeting of the stockholders of the Alaska Juneau Gold Mining Company, a corporation created under the laws of the State of West Virginia, will be held at the office of the company, at No. 320 Sansome Street, in the City of San Francisco, California, on the 25th day of April, 1901, at 12 o'clock noon, for the purpose of reducing the capital stock of said company; at which meeting a resolution will be offered to reduce the authorized capital stock of said company from 500,000 shares of the par value of $10 each to 500,000 shares of the par value of 10 cents each. By order of the President.

R. M. MEIN, Secretary.

Published Notice of Decrease of Stock.

Notice is hereby given, that a general meeting of the stockholders of the Union Hill Consolidated Mines, a corporation created under the laws of the State of West Virginia, will be held at the office of the company, at No. 320 Sansome Street, in the City of San Francisco, California, on the 25th day of April, 1901, at 11 o'clock A. M., for the purpose of reducing the capital stock of said company; at which meeting a resolution will be offered to reduce the authorized capital stock of said company from 400,000 shares of the par value of $1 each to 400,000 shares of the par value of 10 cents each. By order of the President.

JOSEPH H. MOOSER, Secretary.

C. M. HAMPSON, Mech. Eng'r.
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Design, Erect and Remodel Mills and Power Plants. A scientific test of your steam plant may save you half your coal bills.
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We also make the BURT EXHAUST HEAD.

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WE MAKE A SPECIALTY OF

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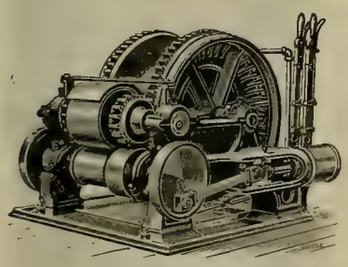
DESIGNED FOR



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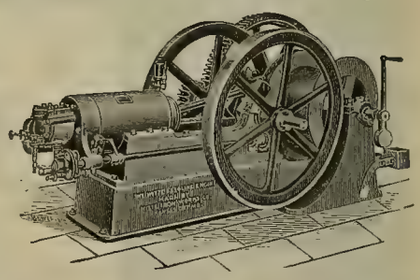

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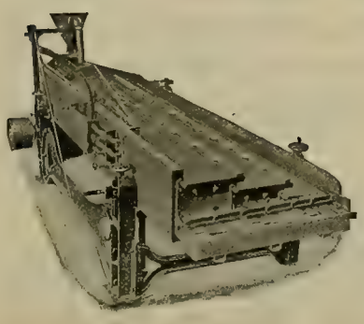

The only table made that will take the place of jigs and do away with costly and complicated machinery.

Especially designed for separating zinc from lead.

Solid Iron Tops, planed to a true surface.

All parts are interchangeable.

Wearing parts reduced to a minimum.

Capacity from 15 to 45 tons in 24 hours, according to class of ore.

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GOLD DREDGES Complete in Running Order

to handle 2500 cubic yards per day at a cost of 3 cents per cubic yard.

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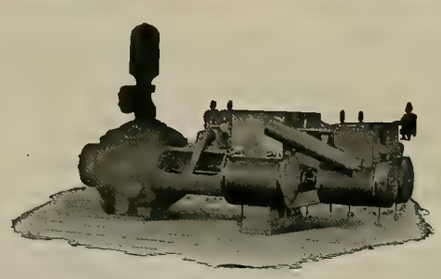

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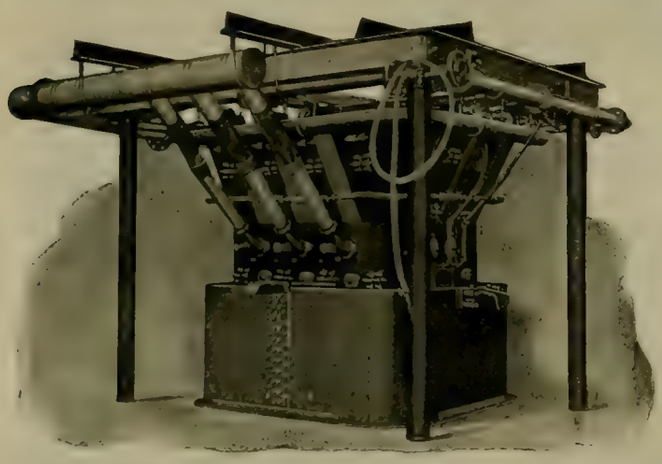

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50 Horse Power

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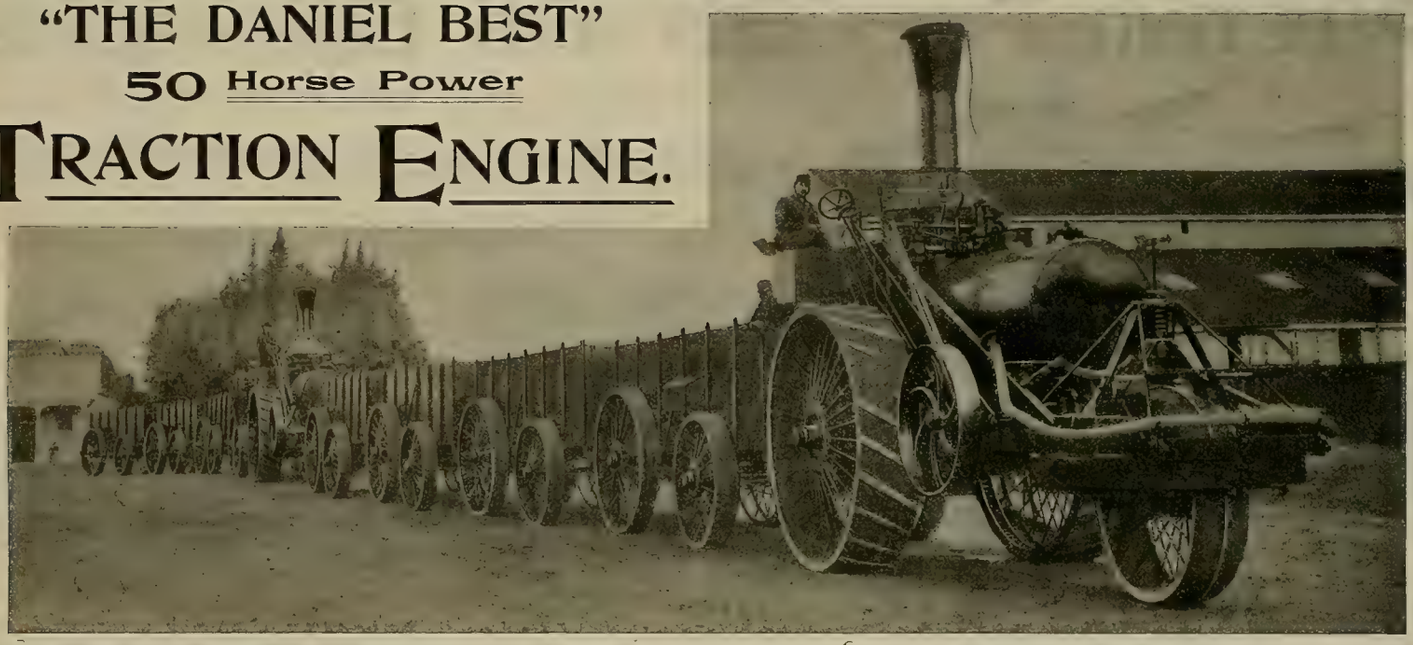

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Capacity of Engine, 50 HORSE POWER.

Over One Hundred of these Powerful Engines in use on this Coast in the principal Logging and Lumbering Camps and for general freighting purposes. EVERY ONE A SUCCESS AND MONEY MAKERS.

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Estimates made for complete Steam Freighting Outfits. Address

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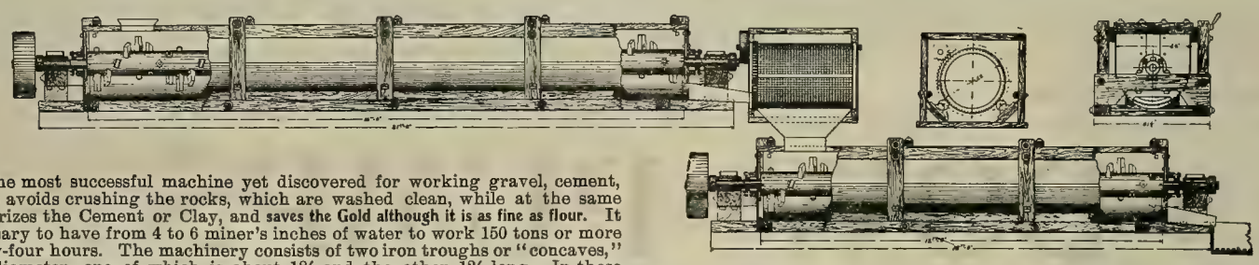
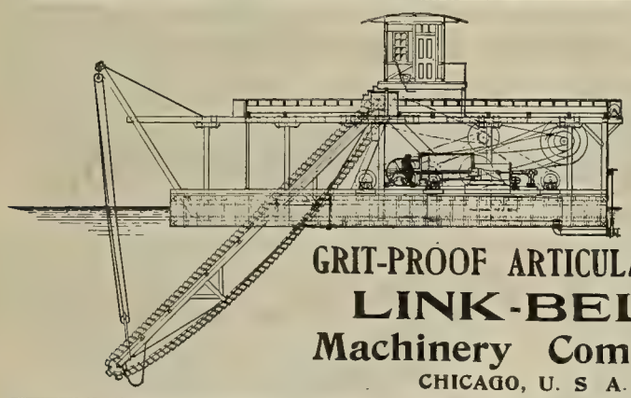


This is the most successful machine yet discovered for working gravel, cement, clay, etc. It avoids crushing the rocks, which are washed clean, while at the same time it pulverizes the Cement or Clay, and **saves the Gold although it is as fine as flour.** It is only necessary to have from 4 to 6 miner's inches of water to work 150 tons or more every twenty-four hours. The machinery consists of two iron troughs or "concaves," each 26″ in diameter, one of which is about 18′ and the other 12′ long. In these troughs are strong revolving shafts with projecting teeth, made of White Iron, 2¾″ wide by 1¼″ thick, placed in spiral form around the shaft about 2″ apart, forming a conveyor. The first shaft is geared to make from 150 to 250 revolutions per minute, and the second one from 300 to 500. There is a revolving screen between the two troughs that takes out the coarser rocks after being washed, and only the finer material runs into the second trough, and is there worked thoroughly. There is a space of about 4″ in the bottom of each trough, or "concave," that fills up with gravel and sand. When the gold is free it settles into this, and as the teeth do not disturb the bottom, the gold remains there until a cleanup is made. In many cases the 18′ machine alone is needed, as the two are only used where we have hard Cement or Clay to work. It requires from 10 to 12 H. P. to run the complete machine, and from 6 to 8 H. P. for the 18′ one alone. I also manufacture a 6′ machine about one-half the diameter of the others, and lighter in proportion, to be run by hand power, with small amount of water, and capacity of about two tons per hour. This can be easily moved from place to place.

For Testimonials and Particulars, Address : : : S. K. SNODGRASS, Denver, Colo. (The Windsor.)



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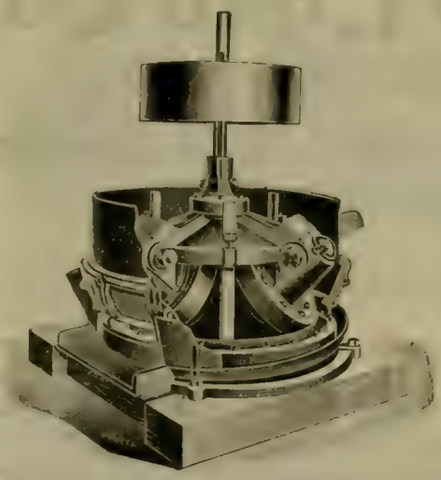

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THREE ROLLER
ORE MILL.

The Griffin Three Roller Ore Mill is a simply constructed Mill, suitable for working all kinds of ores that require uniformly fine crushing by the wet process. This Mill is a modification of the well-known Chilian Mill, but the rollers run upon a crushing ring or die, which is inclined inwardly at an angle of about 30 degrees, the rollers themselves also being inclined to the central shaft of the Mill, thus utilizing the centrifugal force, as well as the weight of the rollers themselves as a crushing agent. The Griffin Three Roller Ore Mill is therefore a Mill of great strength, and has few wearing parts. We construct these Mills with extreme care, using only the best of raw materials, which are most carefully worked by men who are specialists as mill builders. We sell the Griffin Ore Mill on its determined merits, and will gladly supply full information regarding it to any one.

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Perfect Grip Clip,
Absolutely Safe,
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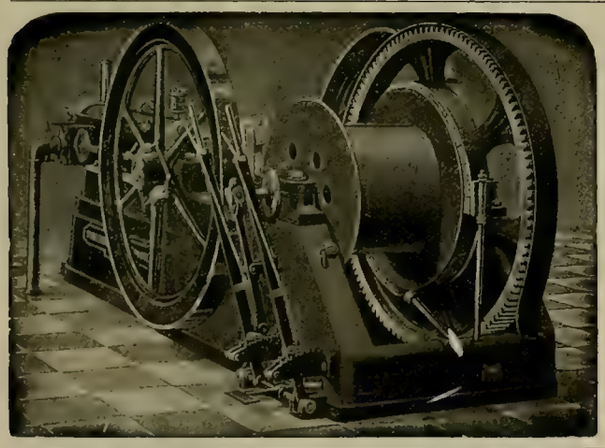

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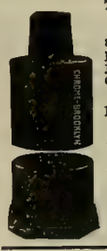

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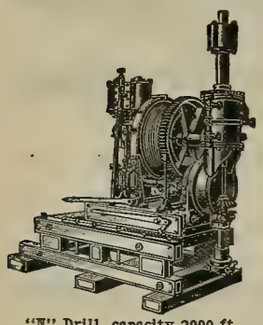

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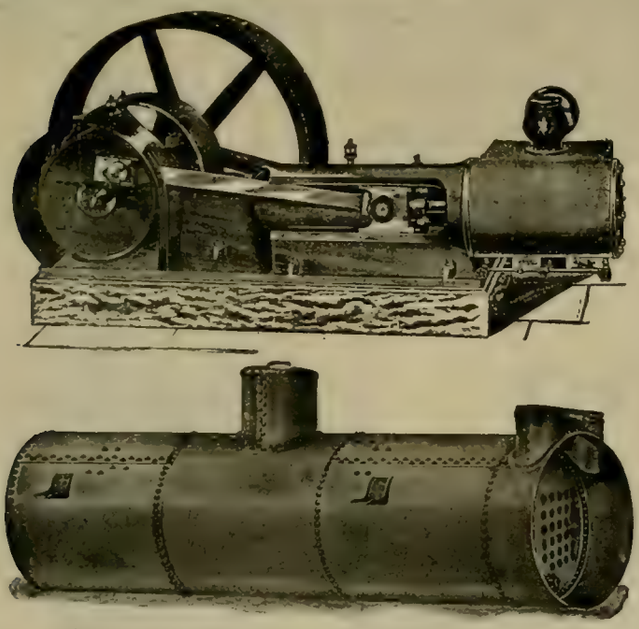

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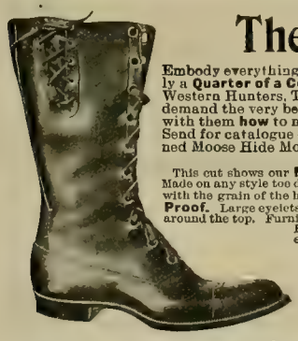

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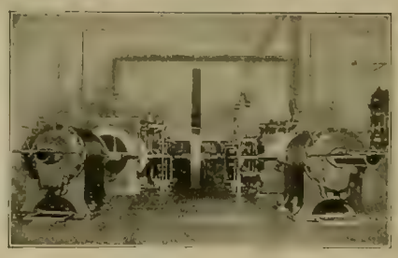

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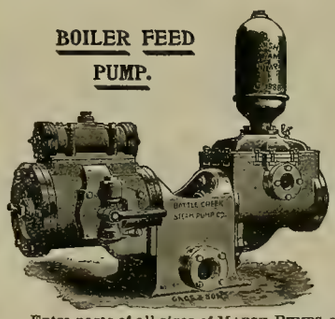

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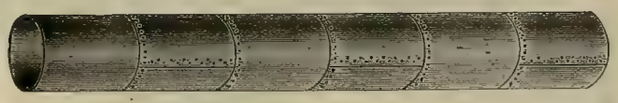

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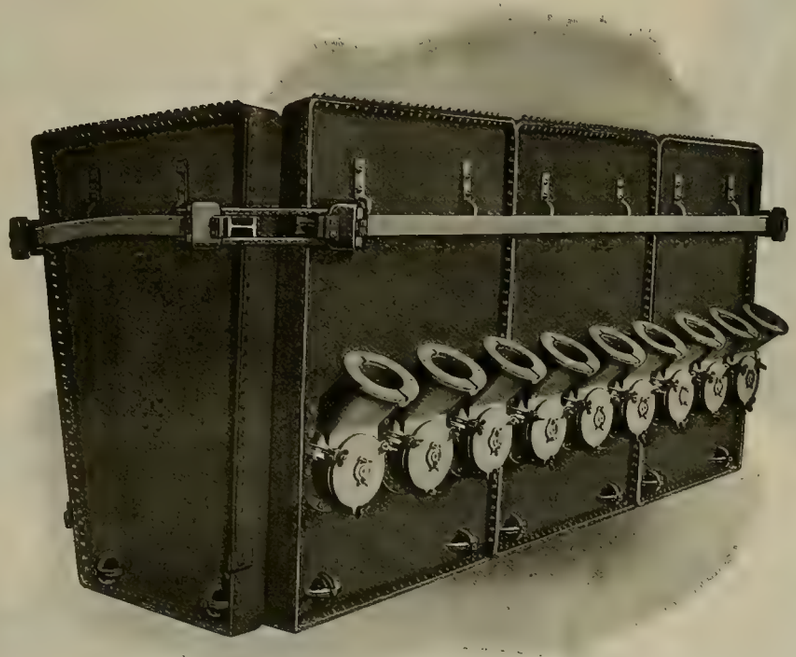

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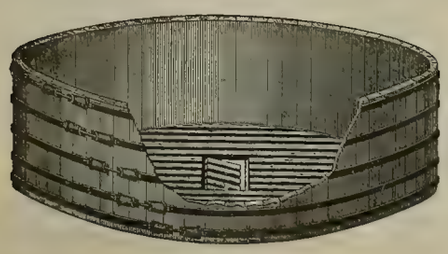

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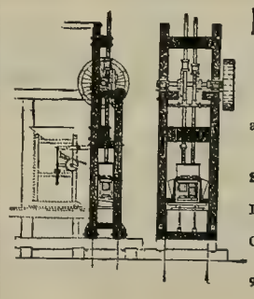

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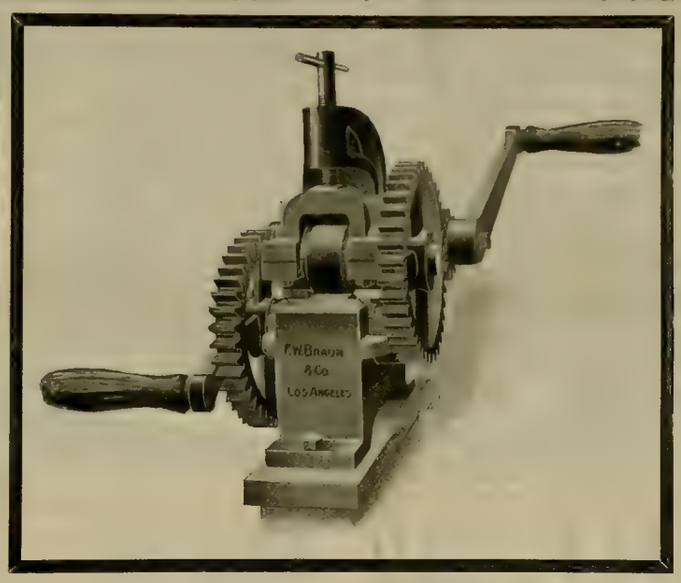

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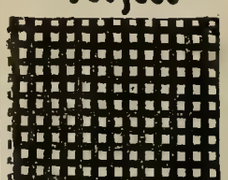

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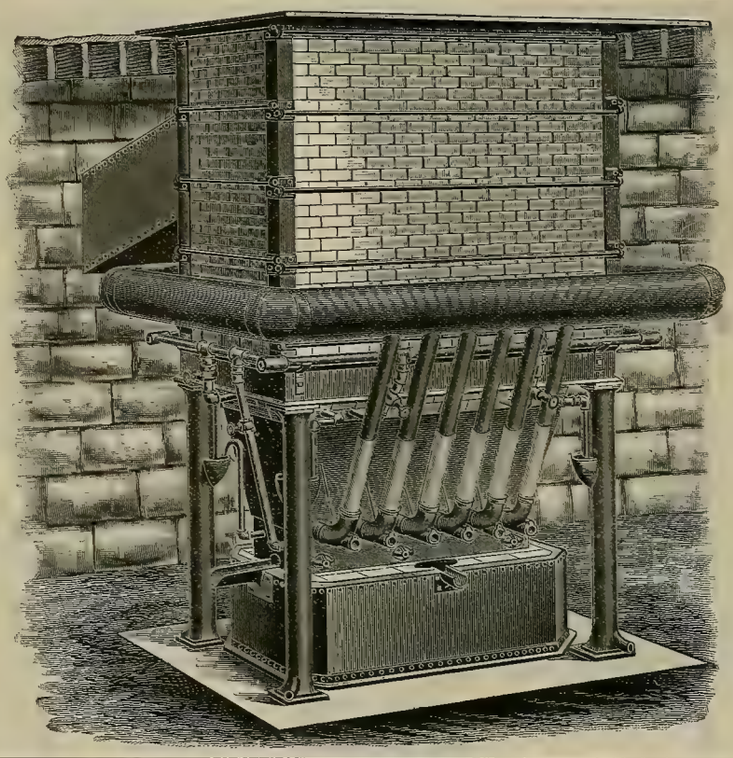

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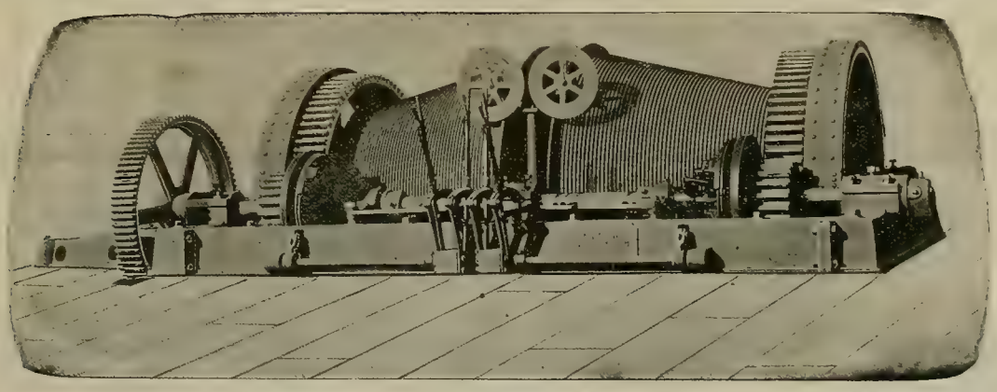

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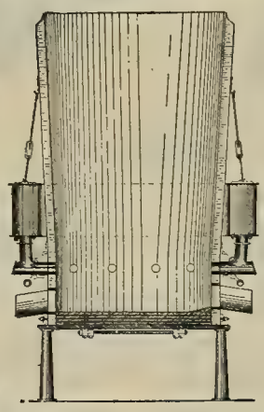

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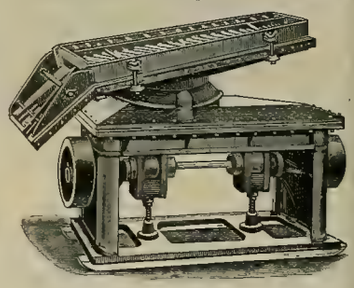

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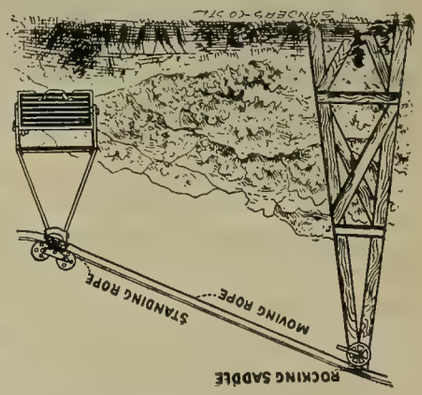

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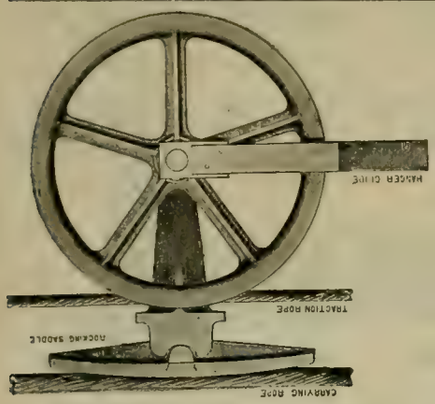

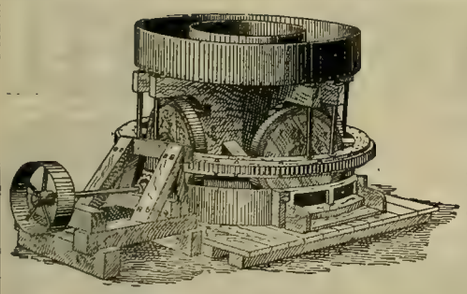

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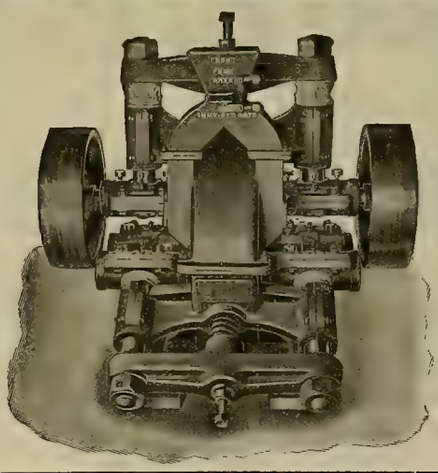

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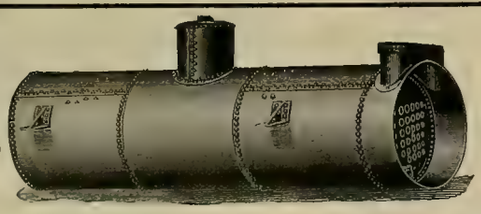

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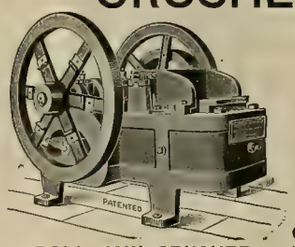

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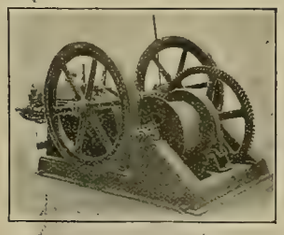

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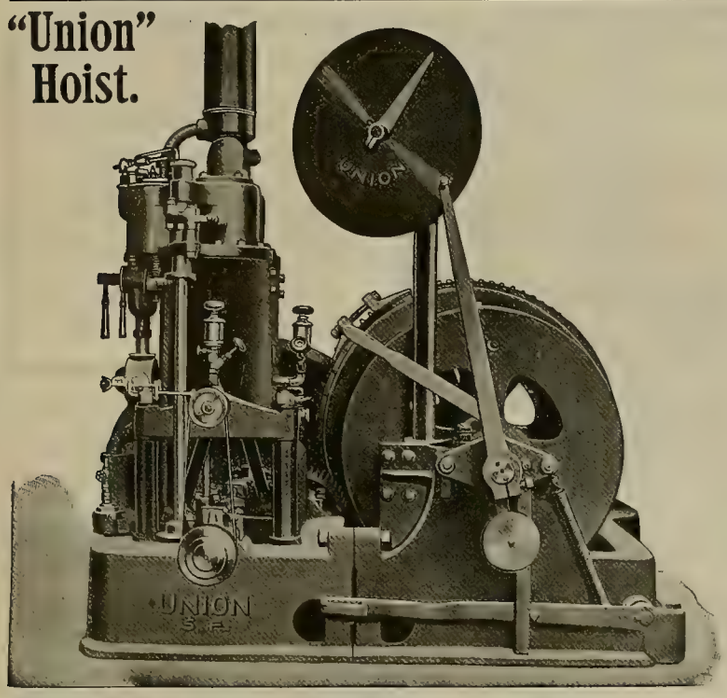

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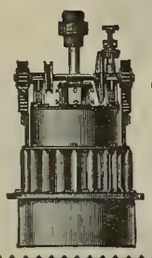

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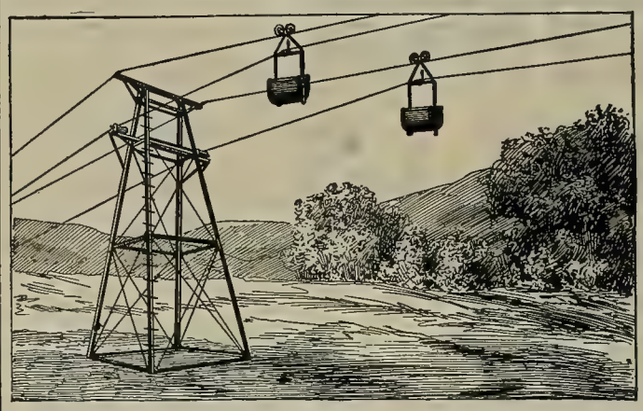

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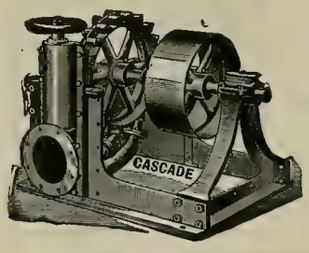

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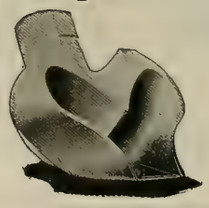

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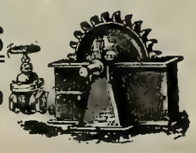

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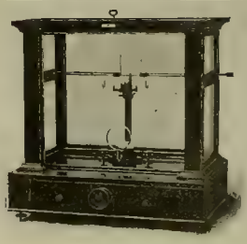

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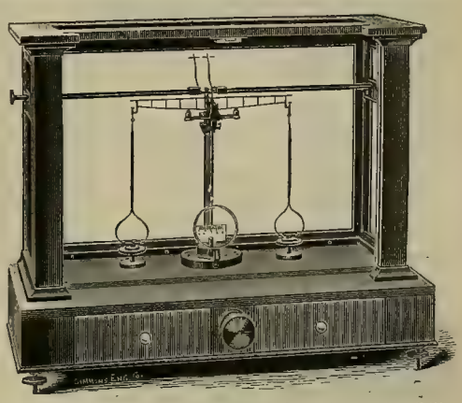

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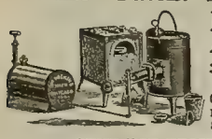

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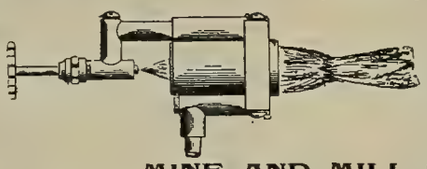

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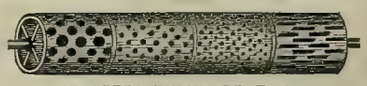

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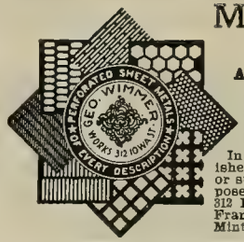

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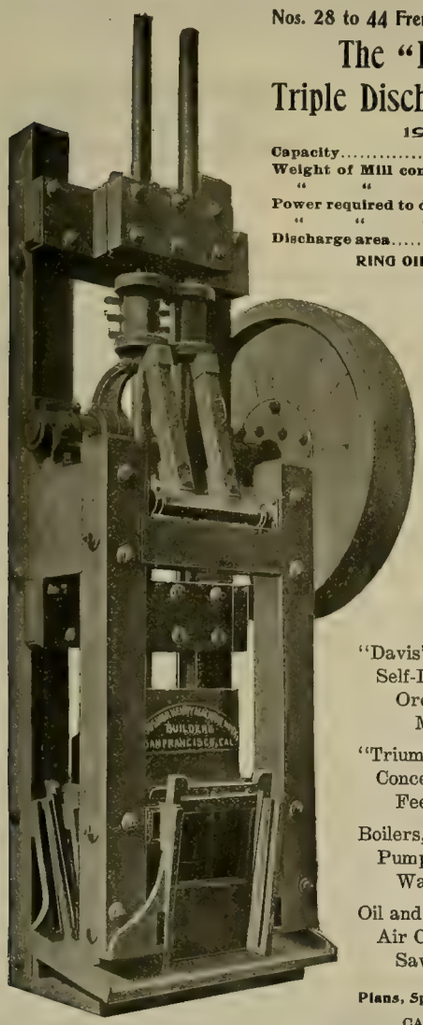

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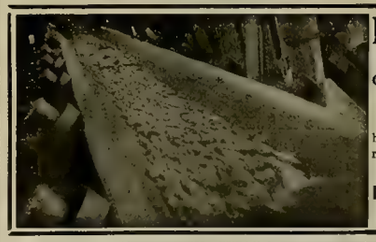

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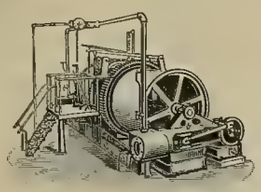

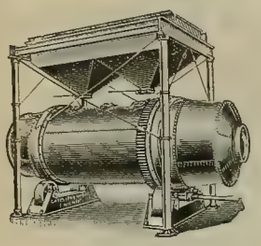

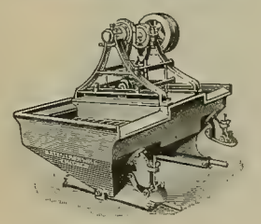

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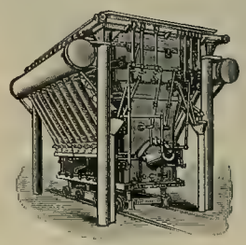

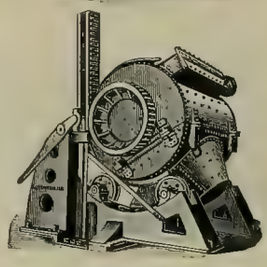

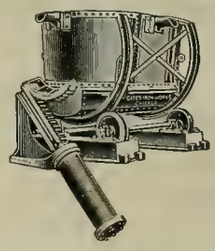

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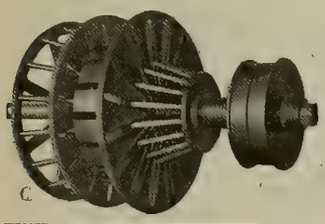

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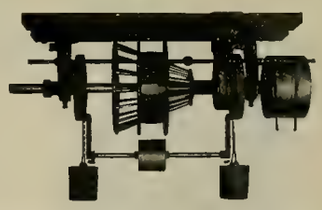

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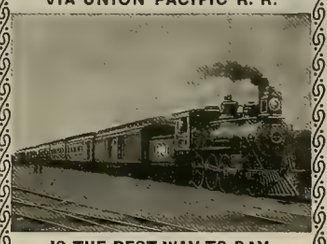

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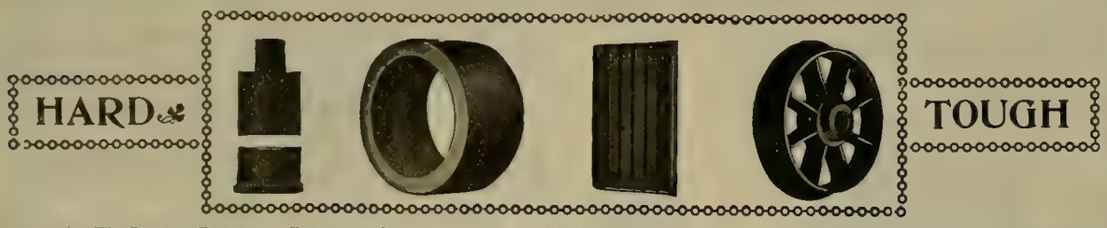

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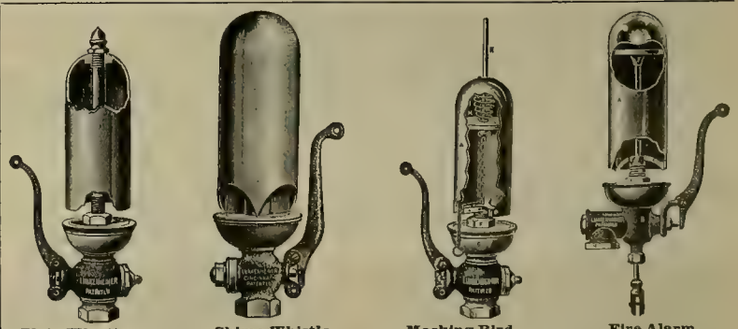

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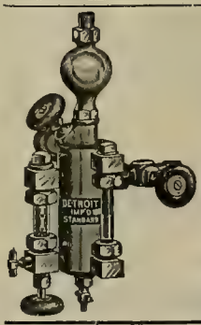

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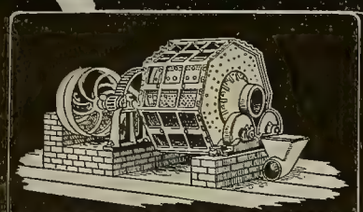

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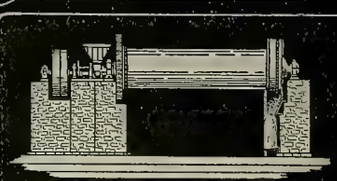

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Notice is hereby given, that at a meeting of the Board of Directors, held on the 13th day of April, 1901, an assessment (No. 22) of Ten ($10) Dollars per share was levied upon the capital stock of the corporation, payable immediately in United States gold coin, to the secretary, at the office of the company, Room 223 Crocker Building, San Francisco, California.

Any stock upon which this assessment shall remain unpaid on the 25th day of May, 1901, will be delinquent, and advertised for sale at public auction; and unless payment is made before, will be sold on MONDAY, the 17th day of June, 1901, to pay the delinquent assessment, together with the costs of advertising and expenses of sale.

By order of the Board of Directors.

ALEX. GRANGER, Secretary.

Office—Room 223 Crocker Building, San Francisco, California.

LARKIN MINING COMPANY.—Location of principal place of business, San Francisco, California; location of works, near Placerville, El Dorado County, California.

Notice is hereby given, that at a meeting of the Board of Directors, held on the 12th day of March, 1901, an assessment (No. 10) of two cents per share was levied upon the capital stock of the corporation, payable immediately in United States gold coin, to the secretary, at the office of the company, 112 Main street, San Francisco, California.

Any stock upon which this assessment shall remain unpaid on the 20th day of April, 1901, will be delinquent and advertised for sale at public auction; and unless payment is made before, will be sold on WEDNESDAY, the 15th day of May, 1901, to pay the delinquent assessment, together with the costs of advertising and expenses of sale.

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SOUTH SLIGER GOLD MINING COMPANY.—Location of principal place of business, San Francisco, California; location of works, Spanish Dry Diggings Mining District, El Dorado County, California.

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Any stock upon which this assessment shall remain unpaid on the 6th day of May, 1901, will be delinquent, and advertised for sale at public auction; and unless payment is made before, will be sold on MONDAY, the 27th day of May, 1901, to pay the delinquent assessment, together with the costs of advertising and expenses of sale.

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Office—402 Front street, Room 8, San Francisco, California.

AMERICAN OIL AND REFINERY COMPANY.—Location of principal place of business, San Francisco, California. Location of works, Contra Costa County, California.

Notice is hereby given, that at a meeting of the Board of Directors, held on the 26th day of March, 1901, an assessment (No. 3) of five (5) cents per share was levied upon the capital stock of the corporation, payable immediately in United States gold coin, to the secretary, at the office of the company, Room 323 Parrott building, 825 Market St., San Francisco, California.

Any stock upon which this assessment shall remain unpaid on the 29th day of April, 1901, will be delinquent, and advertised for sale at public auction; and unless payment is made before, will be sold on MONDAY, the 27th day of May, 1901, to pay the delinquent assessment, together with the costs of advertising and expenses of sale.

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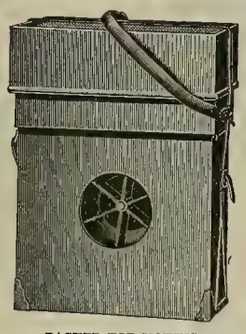

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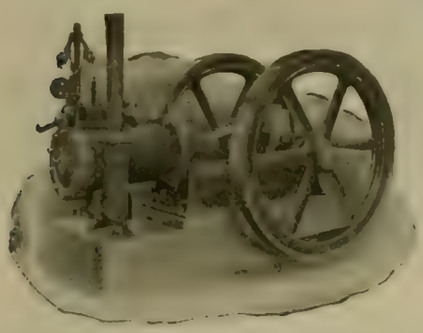

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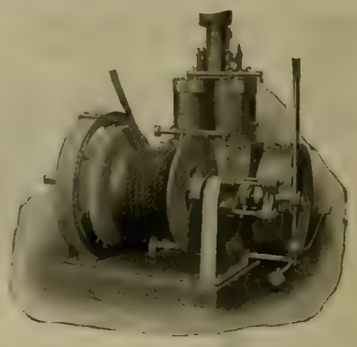

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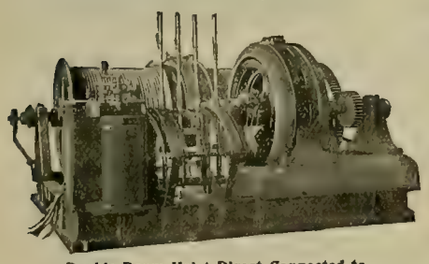

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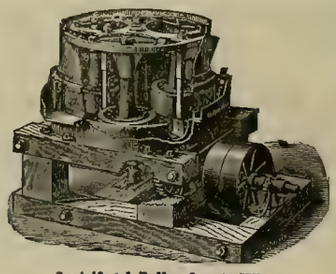

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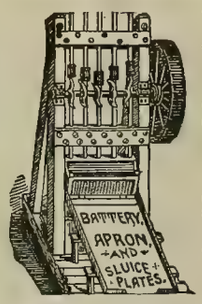

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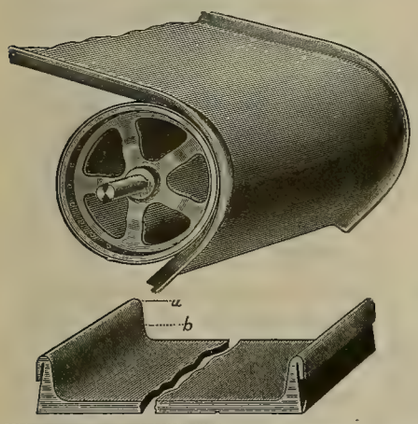

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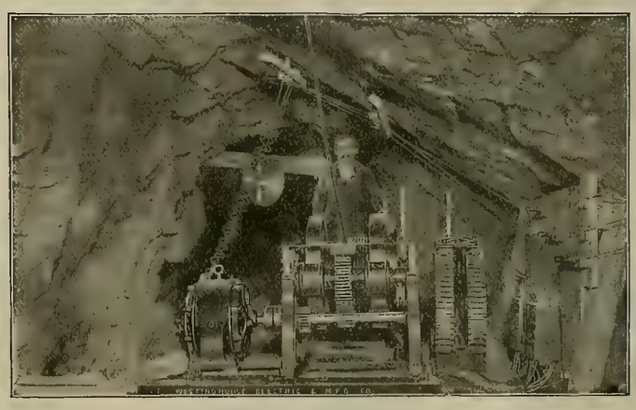

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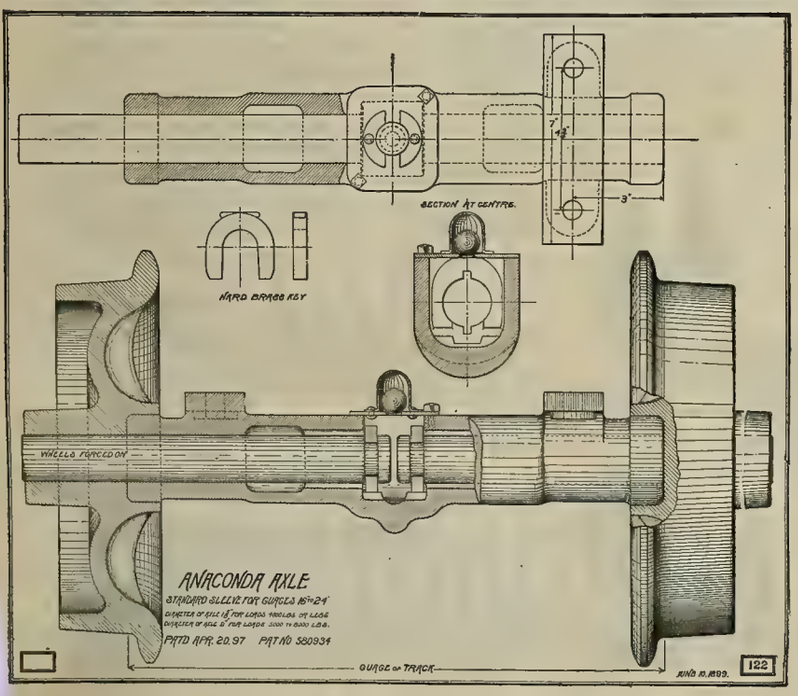

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Where Petroleum Is in California.

Geological surveys have determined the occurrence of petroleum in California to be limited to a series of strata—conglomerates, shales and sandstones—that are comparatively young rocks. In technical geological language they are rocks of the later (upper) Secondary Age, Cretaceous, and of the Tertiary Age, Eocene and Neocene. The strata are very little or not at all metamorphosed, are fairly conformable and, with the exception of some local beds, are known to have been formed in salt water, as they contain fossils of marine animals. Some local beds are known to have been land-formed, coal-bearing formations and lake beds, as there are found in them fossils of land animals and land plants. The presence of these land-born strata bedded with the others does not carry with it any inference of uncertainty as to the beginning of the petroleum being in the sea-formed beds. The topographical life history of the area now known as California, read from the structural geology, clearly admits of not only the possibility, but the probability that some portions of the area were submerged at one time by sea waters and at another time by fresh waters. In the first case the rock-forming sediments might accumulate marine plant carbon, which might have subsequently become petroleum, and in the other case they might accumulate land plant carbon which might have subsequently become coal.

The petroleum-bearing rocks have been referred to as comparatively young rocks. Underlying them, and constituting the old land surfaces, from which came the sediments to build the petroleum-bearing rocks, are a distinctly different series. These are geological rocks of Primary Age, Silurian, Devonian and Carboniferous and rocks of the earlier (lower) Secondary Age, Jura-Trias, the gold-bearing series. These strata, with very few observed exceptions, are highly metamorphosed, the stratigraphy or order of strata is uncertain and there is a marked break in succession, an unconformity where they come in contact with the series of rocks first described. They are not petroleum-bearing or coal-bearing, but are noted as metal-bearing, being the lode home of gold, silver, copper and quicksilver.

General View of Cananea Camp, Sonora, Mexico. (See page 201.)

The preliminary step to determining the probable place of formation of the strata which might become petroleum-bearing is a reconstruction of the topography of the area. On page 201 is a plat showing a suggestive reconstruction of the land and water areas of what is now California, at the beginning of the period in which the now petroleum-bearing sediments were accumulated. Opinions can differ as to the details, for example, the division and number of coastal islands, but the general scheme of construction is rather more than possible—it is logically probable. There is a striking similarity observable between this reconstructed Upper California with what Lower California and the Gulf of California are now, and with what the island-bound coast of southeastern Alaska is now. The reconstruction of the map is made by platting the lines of surface contact of the old metamorphic rock formations with the younger series. What are now the Coast Range mountains must then have been a group of islands, and the area where now are the Cretaceous and Tertiary sandstones, shales and conglomerates must then have been sea water.

Examining the plat, and taking cognizance of the knowledge that sediment-laden streams then flowed both from the main land and islands, it is readily apprehended that the sediments could form rocks, known now as petroleum-bearing, in the shallow waters next the island and mainland coasts and on shallow banks that could, and doubtless did, exist in the old sound.

Inorganic nature by physical law accomplishes a selection of physical conditions ending in local geological phenomena, just as organic nature accomplishes by affinities a selection of individuals ending in the survival of the type of the fittest. So with this vast area of possible petroleum-bearing lands, nature has selected, by first eliminating: the mainland shore areas generally, because the sediment accumulating was out of proportion to the possible accumulation of carbon from marine vegetation; the areas at the mouths of island streams, from the existence of the same condition; areas along the island coasts where the water was too deep, admitting only a narrow line of possible accumulation; areas where the marine plant growth was scanty; areas where the plant remains had accumulated sufficiently, but the metamorphism of heat went too far, or not far enough; and areas where the folding and tilting of the strata has released the once-existent petroleum to the atmosphere, or buried it too deep for commercial effort; and what after these eliminations is then left—"oil lines" or "oil pools"—are the places where petroleum now is.

Smelter of Greene Con. Copper Co., Cananea Camp, Sonora, Mexico. (See page 201.)

MINING AND SCIENTIFIC PRESS.

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San Francisco, April 27, 1901.

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A MINE is not exclusively a work of nature. Nature provides raw material in a metal-bearing deposit more or less remote from the point of desired use. The metal is more or less in mechanical and chemical combinations with minerals that it must be separated from before it is available. From this raw material man and money build the mine. Money, which is the conserved physical energy of many men, and man, the intelligent force that plans and contrives with money to build in the raw material the structure, which built, is then a mine. The struggle to make a short cut to wealth through the discovery of a mine, the finding of a treasure created and buried by nature, has enormously increased the number of people who are prospecting everywhere through possible and even impossible areas for valuable mineral. These newcomers to the industry are not miners and to their inexperience it seems very simple. They have only to find the place where the valuable mineral indicates its existence. Then is fortune—the fortune they have sought—their own. In reality, they have only found possible raw material for a mine. The float that pans gold, the croppings that show mineral, the specimens that give high assays, only indicate where there may be raw material; they are not surely even the beginning of a mine. Some money and some knowledge must first be used to determine if there be even the beginning. Much delay and disappointment can be avoided by recognition of this fact. Miners, as a rule, do recognize it; but the newcomers, seemingly, have to be disappointed, not once, but many times, before comprehending this fundamental fact. The people who rushed from other avocations than mining to Alaska and the Northwest to find fortune in the mines, are those who most need this knowledge of what a mine really is, and how, and at what cost it is made. These well-intentioned people have devoted their energies to the locating of claims, not to the making of mines or a mine. As a consequence, vast areas of land well worth careful prospecting are practically withdrawn from exploration. In some exceptional instances a surface showing justifies a cash purchase by capital; but the tenderfoot locator does not even make a surface showing, just however expecting to sell as if it was a developed mine. What he should do first is to open the surface either by cross or longitudinal stripping, breaking into the solid lode formation at many points. Assay many samples and establish the surface extent of apparent payable values. Next either tunnel or sink one or more shafts in the apparent payable surface. These things done there is then sufficient in sight if values continue underground to invite the assistance of capital in carrying the risk of the further exploration and opening which may make the mine. All this examination and preparation consumes time and requires labor. In the short season of the North one or two claims or a single group is the practical limit of a prospector's ability. Location of more than this is simply time and energy wasted by scattering. Efforts to find in any locality the raw material for a mine must be concentrated to be effective and particularly must they be so in Alaska.

IN a few weeks the President of the United States will dedicate a commemorative fountain in front of this office to the mechanics of San Francisco. It stands a massive structure of bronze and granite of striking appearance, erected at a cost of $25,000—a bequest by the Donahue estate. The Donahue foundry and machine shop was the original establishment from which grew the great Union Iron Works, and it was the mining industry that created the establishment which has since built sea-going vessels that have added new renown to the American navy. In connection with the gift of the Donahue estate in the shape of the fountain that will embellish San Francisco's great thoroughfare, it is worthy of note that the second casting that ever came from the old Donahue foundry was for a stamp mill. N. W. Spaulding, now in the saw business on First St., San Francisco, built the first quartz mill made in San Francisco. Two primitive mills had been shipped from Boston in 1850—one for Grass Valley, Cal., the other for Mr. Spaulding for the Middle Fork of the Tuolumne river. During stress of weather on the voyage, Mr. Spaulding's mill was thrown overboard to lighten ship. He had whipsawed the lumber for flumes, etc., and on coming to San Francisco for his mill, and learning of his loss, he paid 40 cents a foot for lumber to make patterns, and paid Peter Donahue 30 cents a pound for some castings—the second lot cast in the old Donahue foundry, the first casting having been a new crank for the Sacramento river steamer McKim. The Grass Valley mill was about a month ahead of Mr. Spaulding's San Francisco built mill. All this was just fifty years ago; and when, on the 21st of next month, the President of this nation of 80,000,000 people dedicates the monument in front of our window to California miners and mechanics, the minds of a few pioneers will go back to the small beginnings of half a century ago, when in this west half of America was being laid the foundations of a great industrial empire.

THE article on "Pneumatic Processes for Leaching and Cyaniding," by Dr. J. Ohly, should have the consideration of those engaged in mining the sulphide ores carrying gold, silver and copper. Many mines of these ores are so remote from smelters that unavoidable transportation charges make profit through shipping impossible, and smelting at the mine is prohibited either by the difficulty of securing an economical furnace charging mixture of ores or the cost of fuel transportation. Under such conditions improvements in wet methods, leaching, cyaniding or electrolytic, are the hope of the miner. Methods which make it possible to get the values out of the ore at the point of production are particularly what the small mine needs. Concentration of valuable mineral from waste has accomplished a great deal, but the field for such methods as Dr. Ohly describes is much wider and inclusive largely of the field occupied now by concentrating methods. The particular merit of these processes is in the simplicity of their requirements in the way of plant, chemicals, reagents and expert attendance. The structures and machinery required are not costly as compared with the requirements of smelting plants. The chemicals employed except the cyanide of potassium can be manufactured on the ground where the process is not itself regenerative of the active reagents. The knowledge of the manipulation necessary is readily acquired and is further largely mechanical. The miner, at the end of his treatment, has the gold and silver from his ore in a form in which he can realize on it directly. The mints coin the gold and the silver has the market of the world for its own. Copper the miner has as "cement copper," a form in which to realize on it he does not have to pay transportation charges on waste.

Magnetic Concentration of Iron Ores.

Enormous deposits of magnetic iron ore, too low in percentage of iron to be economically smelted directly, but capable of cheap concentration to sixty-four per cent of iron by the Edison magnetic concentration process, have been discovered in Norway. English iron and steel makers are reported as proposing to furnish the capital for the exploitation of these deposits by this process. They expect using this concentrated ore to be able to meet successfully the competition of the United States steel makers.

However this last may be, the adoption of the Edison process is a commercial recognition of the merit it possesses for use within its natural limits. The popular impression in the United States has been persistent in declaring the process a failure, judging from the economic failure of the great New Jersey plant. The fact was that the process as a process did not fail in New Jersey. Technically it succeeded in accomplishing what was claimed for it. The truth was that it was applied commercially outside of its natural limits. The rock that was treated only contained eight per cent of magnetite, the commercial sale return of which was too small to carry the cost load of mechanical treatment of ninety-two per cent of waste rock. In Norway the process is to be applied to a rock containing from fifty to seventy per cent of magnetite, the sale of which can pay for the handling of thirty to fifty per cent of waste. The Englishmen seem to have grasped the profit possibilities of the process through the discredit that attached to it as a result of misplacing its application, and are apparently not backward in using it. Some years since a Welsh iron making company made a contract with Lake Superior ore producers for the delivery to them of some four millions of tons at $5.20 a ton. Recent lessening of costs of manufacture in American mills has made this source of raw material supply too costly for English mills.

The idea of Edison's New Jersey plant, in the light of progress since, was clearly correct. It aimed to eliminate human labor as a major factor in cost and to eliminate transportation, which succeeding labor would become the only reducible major factor. These two factors constituted the line of least resistance. The enterprise failed commercially because the same thing was done at the Lake Superior mines, in means of transportation of the ore to the furnaces, and in the metallurgy at the furnaces. A commercial condition admitting of profit to the New Jersey enterprise when it was planned did not exist when the enterprise was operating. Mr. Edison and his associates forgot that the other fellow was thinking, too.

The reduction of cost to the consumer on the line of least resistance is still taking place. Within the last two years the men who make iron and steel in Ohio and Pennsylvania have been investigating the iron ore deposits on the Pacific coast and in the intermountain region between, but particularly the former. The production of the metal from the ore on this coast will cut off a railroad transportation cost that will be of great commercial advantage in supplying the demands of eastern Asia, the great market for years to come. It must be recognized that the Chinese, having iron and coal deposits, will in the end use their own raw materials and their own labor to manufacture iron and steel. The coming of that end can be deferred by reducing the costs of the foreign production intended to supply the Chinese demand. If this reduction can be done by eliminating rail transportation, of either ores, fuel or finished product, the Pacific coast will become the place of a great metal producing industry.

On this Pacific coast the magnetite ores exist under conditions that would seem to make processes of magnetic concentration specially applicable. Aside from the low grade, there are mechanical impurities that magnetic concentration can eliminate. Pyrite and titanic iron are the more common. Neither of these is magnetic and both are mechanically associated with the magnetite. The writer is also advised of the existence with these of chalcopyrite, the common copper bearing mineral. This last, if only in small quantity, one or two per cent, would become concentrated to a valuable commercial mineral by separating magnetically. With these commercial profit possibilities Pacific coast miners can well afford to look for and develop such deposits.

Concentrates.

THE legal measure of water in Utah is 1 cubic foot flow per second.

THE wear and tear of gold coin in circulation is estimated as being 1½%.

THE loss of power in transmission from the electric generators at Niagara to Buffalo is 20%.

MAIL carriers to and from Nome, the route being over the ice by Dawson, charge $1 an ounce postage on letters.

THE gold production of the province of Victoria, Australia, for the first two months of this year is $2,000,000.

A 15x9½-INCH rock breaker is estimated to require about 10 H. P., belt concentrators from 1 to 1½ H. P. each.

ACETYLENE GAS made from calcium carbide is said to be taking the place of kerosene for house illumination in Germany.

THE first use of steam of which there is any record was for the production of a steam jet to increase the draught of a chimney.

A COLORADO sampler asking for $10 a ton ore is the best kind of evidence of the reduction in treatment costs that improved methods are making.

GRINDING TOOLS are made in the United States with which grinding and shaping of metal can be done accurately to the thousandth part of an inch.

MOLYBDENITE, sulphide of molybdenum, is mined commercially in Chelan county, Washington. The consumption is increasing from new uses being developed.

THE great principles which make the metric system so desirable are the single unit for all measures of dimension and quantity and the use of only one divisor.

THE value of the coefficient C in the Chezy formula $v = c\sqrt{r.s.}$ employed to determine the velocity of discharge of water from a pipe of large diameter is 113.8.

THE record for high prices for oil land, if reports are true, is with the Beaumont field in Texas. One acre 300 feet from a gusher is said to have sold for $25,000, spot cash.

THE discovery of diamonds in South Africa was made in March, 1867, by John O'Reilly, in the Hopeton district. The first diggings were in the bed of the Vaal river.

WASHOE COUNTY, NEVADA, the next door neighbor of the Comstock, expects to make for the first time this year a mineral output exceeding in value the agricultural.

A MINOR can locate a mining claim, but the right of the minor to make a valid conveyance of the location except by guardian has been questioned in litigation over oil lands.

THE mother lode in California was first known as the "Carson lode." It received this name from Carson Hill, in Calaveras county, where the croppings of the lode were very wide and extremely rich.

IN building a suspension bridge the floor is suspended so as to rise from the ends toward the center, this rise being called the camber of the bridge. For a 100-foot span 6 inches of camber will be sufficient.

BOULDERS OF ROCK, or float, containing valuable mineral, if the same exist in a tract of land in such quantities that the deposit is minable for the mineral, make a deposit which can be located and patented as a placer.

THE world's copper consumption in 1900 was 62,000 tons larger than in 1899. The production is estimated at 17,960 tons less than the consumption. The manufacture of sulphate of copper (blue vitriol) used 25,000 tons last year.

JUDGE NOYES at Nome, Alaska, has ruled that no one has a right to make a location until gold is discovered in the ground. The decision has given satisfaction to the miners and will put a check on the hatchet and pencil men.

FIREPROOF WOOD has been found in service to possess some disadvantages. The chemical salts forced into it tend to reduce its durability and strength, and in contact with iron or steel start an oxidization or corrosion of the metal.

THE local U. S. Land Office at Redding, Cal., recently made a decision holding the validity of a placer mining location for which U. S. patent was sought and dismissing a contest made on the ground that the land was more valuable for timber than for placer mining.

THIS PAPER has referred to the Steamboat Springs, in Washoe county, Nev., as an example of lode formation going on in sight. Lately, in sinking a well for hot water, the owners of the springs have discovered a lode carrying values that are considered sufficient to warrant further prospecting.

THERE are a number of blast furnaces making iron in Japan. No discoveries of deposits of what are known as Bessemer ores, ferro-manganese or chrome iron have been made in Japan. There is a possible market in that country for these ores to supply the raw material for steel making which the Japanese propose to engage in.

LESS than half a century has elapsed since mining engineering was considered a sort of side branch of civil engineering, and about the only branch that had an individual designation. Now the student may choose between civil, mechanical, mining, metallurgical, architectural, electrical, chemical, sanitary, military or naval engineering, each a profession requiring a higher intellectual capacity than all together did fifty years ago.

A HUNGARIAN RIFFLE used in sluice boxes in placer mining is a cross riffle—that is, one in which the bars of wood or iron making the riffles are set transversely or crossways of the box. It is not necessary that the riffle bars should be at right angles; they may be diagonal or may be built in diamonds. The descriptive term covers all these forms of construction.

THE economical distribution of electrical power transmission is continually extending. In California two commercial installations are now operating, transmitting water power from the Sierra Nevada mountains over 160 miles to the cities around San Francisco bay. The electric equipment of the steam railway systems, inevitable in time, will add to this long-distance consumption of electrical power.

A USEFUL CEMENT for cast iron is made by mixing thoroughly in a mortar two ounces of sal-ammoniac, one ounce sulphur, and sixteen ounces of iron filings. Pending use this mixture should be kept dry. When required to use, one part of this powder and twenty parts of iron filings are mixed thoroughly in a mortar and made into a paste with a little water, and is then ready to be used. A little fine grindstone sand improves it somewhat.

THE market for an ore containing some iron, nickel and cobalt along with over 60% of manganese is among the steel manufacturers. Manganese in this mineral form is used for making ferro-manganese as the intermediate product, subsequently used in making special brands of steel. The presence of the nickel might add to its availability. Samples of the mineral can be sent to the Illinois Steel Co. or the Bethlehem Steel Works.

THE lead-silver mines of western Greece and the Rio Tinto copper mines are probably the oldest working mines in the world. Both are known to have been worked several hundred years before the beginning of the present era, the lead mines 2500 years ago and the copper at least 2000 years. The Grecian mines still yield thousands of tons of lead annually, and the Rio Tinto is the third largest producer of copper in the world, being only exceeded by the Anaconda and Calumet & Hecla.

THE rate of setting of a cement increases with the fineness, the chemical reaction with the water taking place the more readily the finer the particles are. Coarse particles do not combine throughout, the water acting toward the fine particles just as if they were sand grains. In setting, the cement absorbs a definite equivalent of water, forming a true chemical combination, more or less crystallized in character. These crystals fill the spaces between the grains of sand and bind them together in the act of setting.

THE advance in the practical adapting of great metallurgical processes to minor utilities has been strikingly instanced in building the track of an electric street car line in the street in front of the office of this paper. The rail bond to make the return current circuit has been made by casting in the joints, the melted iron being provided by a small portable iron melting furnace mounted on wheels and moved by hand as required. The bonding thus made takes the place of copper wires requiring much more elaborate manipulation and cost to put in place.

THE Secretary of the Interior has recently ruled in a case coming from Colorado that work performed on a tunnel should apply on the regular assessment work. Under the ruling, it is said, the expenditure in one tunnel can be divided to cover the amount of assessment work on several lode claims. The decision of the Secretary reverses that of the Commissioner. It is hardly probable that the decision is as sweeping as the brief summary would indicate. Certainly the tunnel work must clearly be directed to the development of the claims that the expenditure is to be apportioned among.

THE commercial scaling of a log to determine the number of feet of 1-inch thick boards it will cut into is done by using any one of several rules. As good a one as any is to scale the small end of the log, taking its shortest diameter in inches. Subtract 4 inches from the scaled diameter and square the remainder. This product will be the number of feet of inch-thick boards in a log 16 feet long. For a log 24 feet long, add one-half; for 20 feet long, one-fourth; for 12 feet long, subtract one-fourth; for every 2 feet difference in length, add or subtract one-eighth to the number of feet calculated for a 16-foot log.

FOR assessment work the location is the unit that the laws consider. If a location is less than 1 acre, if it is 20 acres, or if it is the 160 acres maximum for placer locations, the requirement of annual assessment work is the same, $100 on the location. If several contiguous locations are consolidated into one claim, work may be done on one for all, but in that case the sum of $100 for each location must be expended in the assessment work. It is safer to perform the assessment work on each separate location. It eliminates a question fruitful of litigation, the question whether or not the work done on one location does as a fact develop the others.

GOLD and tin ore occur at Mount Cameron, near Gladstone, northeastern Tasmania. The mountain is composed of granite, crossed by dikes of porphyry, which is capped on the southern and northeastern flanks by metamorphic slate and sandstone schists. Several gold-bearing quartz veins have been discovered in the schists, not far from the contact with the granite, a peculiarity of these veins being the resemblance of their filling to fine-grained gray to reddish quartzite. In the Royal Tasman vein the quartz became poorer in gold with depth, while cassiterite made its appearance, particles of gold and crystals of cassiterite being found close together. A remarkable association of tin sulphide and gold and silver minerals is also found in Bolivia.

THE seven cables of the Bay Counties Power Co. spanning Carquinez straits, Cal., 4427 feet between the towers, are each seven-eighths of an inch in diameter, made of nineteen wires, each one-eighth of an inch thick. The breaking strain of a cable is 96,000 pounds and the actual strain on it is 23,000 pounds, giving a safety factor of four. The cables sag 224 feet from the south tower and 146 feet from the north tower. The clear distance of the lowest point of the sag above high water is 208 feet. The cables are said to move less in a windy day than in a quiet one, the strain of the wind probably acting so as to destroy any vibratory movement in the cable, and equalizing to a steady pressure in the long line, there is no swinging. In high winds it has been noted that the cables become charged with static electricity from the friction of the moving air.

THE rulings of the U. S. Land Department have made marble locatable under the provisions of the Revised Statutes relating to placer claims. Another ruling of the department requires a discovery of the mineral (marble) on each 20-acre tract of a location. If the marble is a horizontally bedded deposit a placer location could be made with a little exploratory work to include 160 acres. If the deposit is narrower and dips beneath other rocks, a high authority on mining law states that properly the deposit should be located as a lode which would limit a claim to 1500 by 600 feet, or 20 acres. The Land Department, though later rulings say marble is placer, has accepted and patented limestone deposits as lodes. On what would be strictly speaking a ledge of marble neither lying nearly flat or nearly vertical, a locator might take it up both ways, as a placer and as a lode.

THE rim speed or rate of motion of the circumference of a water wheel of the Pelton type should be exactly one-half the velocity of the jet of water impelling the wheel. The velocity of the jet is taken as the spouting velocity of water through a circular opening in a thin plate multiplied by a fractional coefficient determined experimentally. With the rim speed exactly one-half of the velocity of the impelling water jet, action and reaction are equal. The water in doing its work loses half of its velocity, and the remainder of the velocity keeps the water even with the motion of the rim of the wheel till the two separate, the water by gravity, its force spent, dropping into the waste way. If the rim speed exceeds this half of the spouting velocity of the water, the wheel is racing, and it requires either less water or more load; if the rim speed is less than half the velocity, it requires more water or less load. In either case there is a loss of efficiency.

THE official call of the fourth annual session of the International Mining Congress at Boise, Idaho, July 23d, states the objects of the congress, among which are: "To secure better recognition of the mining industry by the National Government; to bring about needed changes in the Federal mining laws; to exchange practical ideas covering the various phases of the mining business and especially to take under advisement the importance of the creation by the Congress of the United States of a department to be known as the Department of Mines and Mining, thus securing a cabinet officer that represents an interest which affects more than one-third of the people of the United States, producing in 1900 over one billion of dollars." The basis of representation will be: The Governor of each State and Territory to name thirty delegates at large; the county commissioners of each county to name five delegates at large; the mayor of each city and town to name five delegates at large and one additional for each 10,000 population or fraction thereof; each mining bureau, each mining exchange, each real estate exchange, each chamber of commerce, each board of trade, each miners' union and each trade and labor union to name five delegates, and other commercial bodies to select a like number of delegates.

GOLD MINING AND MILLING costs are not always capable of direct comparison between different mines. In the mining, the size and pitch of the vein, the hardness of the rock, amount of water to be handled, the nature of the power and machinery employed, involve in different mines unavoidable influences in costs of extraction and delivery at the reduction works. In the milling, the hardness of the ore, the fineness of the crushing, quantity and character of the sulphurets that must be concentrated, source of power employed, are another set of conditions making unavoidable differences in costs. Sometimes these differences balance off in the aggregate, more often their effect cumulates the total difference. While it is desirable to take as a standard the cheapest successful mining and milling, expectations of profit in new enterprises should not be based on realizing it. It is quite a fad with prospectus writers to use the extremely low cost charges obtained under exceptional conditions, after years of experiment and improvement, to demonstrate the desirability of the new enterprise they offer. The facts are, however, against these figures. The conditions are never the same and even the best that can be done with mining and milling in any mine is only learned after doing a great deal of it with that mine.

Pneumatic Processes for Leaching and Cyaniding.

Written for the MINING AND SCIENTIFIC PRESS by DR J. OHLY.

These two processes, known respectively as the pneumatic process for the lixiviation of copper ores and the pneumatic cyanide process, both of which are covered by patents, are worthy of the most intimate consideration and study, since they introduce an element into the extraction of copper and gold values from their respective ores which is of the greatest import as to the increased output effected thereby and the reduction of the time employed in the usual leaching operations effected by means of sulphuric acid or cyanide. They are based upon the principle that the air contained in the solvents employed is not present in quantities sufficient to support and maintain the oxidation process ensuing, and that the oxygen required must, therefore, be applied from the outside in a mechanical manner, so as to render the dissolving reaction a continuous one and to assure a complete extraction of the values present. This purpose is accomplished not only by the introduction of perforated pipes, which send a steady current of air bubbles through the liquid, but also by applying heated and compressed air, when the increased affinity and the agitation produced thereby cause a more intimate contact of the gold, silver or copper atoms with the solvent, while the presence of free oxygen enhances the formation of the metallic solution to a remarkable degree. When applying the pneumatic cyanide process the perforated pipes, mentioned above, are make of iron throughout, as potassium cyanide in aqueous solution does not affect them, while in the pneumatic process for the extraction of copper ores these conduits are constructed for the main part of iron, and only so far of lead as they are immersed in the dilute sulphuric acid or other solvents attacking iron.

Besides these points, however, another principle of physics, bearing upon the pneumatic processes, is to be taken into consideration, for it is well known that on conducting air into water and expelling the former by boiling the original proportion by volume of oxygen to the nitrogen, as contained in air, which is 21 to 79, respectively, undergoes a remarkable change, since the oxygen contents are materially increased thereby. This circumstance is readily explained by the greater solubility of oxygen in water in comparison to that of nitrogen, so that the air expelled from that liquid consists of 34.9 volumes of oxygen and 65.1 volumes of nitrogen. (Bunsen.) On the other hand, water saturated with air or aerated water, as it is always found in nature, contains by the short ton or 34 cubic feet but $\frac{1}{5}$ cubic foot of oxygen, weighing 141 grains, or nearly $\frac{1}{3}$ ounce avoirdupois, and $\frac{1}{2}$ cubic foot of nitrogen, weighing 249 grains, or about $\frac{1}{2}$ ounce—a quantity which must necessarily appear as quite insufficient for "maintaining" the dissolving process carried on either in the presence of cyanide solution or sulphuric acid. These points will gain considerably in clearness by considering the relative chemical formulæ representing the processes to which we have reference, when it will be seen that 158.6 parts by weight of chalcocite require 128 parts of oxygen for complete solution, while gold and silver, which are both saved in the cyanide process, require one atom of oxygen for every atom of the two precious metals for perfect extraction.

$$\text{I.}\quad \underset{\text{chalcocite.}}{Cu_2S} + \underset{\text{four oxygen molecules.}}{4O_2} + \underset{\text{sulphuric acid.}}{2H_2SO_4} = \underset{\text{copper sulphate.}}{2CuSO_4} + \underset{\text{sulphuric acid.}}{2H_2SO_4}$$

It is also evident from this equation that the complete decomposition and oxidation of chalcocite is accompanied by the regeneration of the original weight of the sulphuric acid added, and it is known that a result approaching these conditions can be reached by applying cold, heated or compressed air as a promotive medium in the lixiviation of gold, silver or copper ores. The equation representing the reaction occurring as to the two first named minerals is generally given in the following form, and is known as Elsner's equation, the latter chemist having first advanced it as given below, and called special attention to the necessity of oxygen being present in abundance:

$$\text{II.}\quad \underset{\text{potassium cyanide.}}{8KCy} + \underset{\text{gold.}}{4Au} + \underset{\text{oxygen molecule.}}{O_2} + \underset{\text{water.}}{2H_2O} = \underset{\text{gold-potassium cyanide.}}{4AuKCy_2} + \underset{\text{caustic potash.}}{4KOH}$$

Identical with this equation is that given for silver, inasmuch as that metal forms also a double salt of silver and potassium cyanide, analogous in composition to that of gold, as shown below, both metals being recovered from the solution when passing the zinc shavings in the precipitation boxes, whence they are removed to be subjected to the fluxing process usually employed for the reduction of bullion:

$$\text{III.}\quad 8KCy + \underset{\text{silver.}}{4Ag} + O_2 + 2H_2O = \underset{\text{silver-potassium cyanide.}}{4Ag\,KCy_2} + 4KOH$$

These points having become clear, it will be seen from the following representation of the reaction ensuing on subjecting chalcopyrite or speckled copper ore of the composition of $CuFeS_2$ to leaching with sulphuric acid that the same weight of oxygen is required for producing complete oxidation and solution as in the case of chalcocite, while the iron and sulphur present absorb four molecules of oxygen to be transformed into ferrous sulphate and sulphuric acid, respectively. This view of the reaction is undoubtedly the correct one, if we bear in mind that the molecule of sulphuric acid added selects the copper of the mineral for its base exclusively, and combines with it to form copper sulphate—a procedure which is most likely to ensue. We assume, of course, that the ores to be treated in these cases are concentrates, relatively free from foreign admixtures, and have not been subjected to a previous roast, as is actually done in many lixiviating works. Whenever it is intended to leach the ores under these conditions, however—and it seems that modern methods naturally aim at the simplification of the operation as far as possible—the employment of the pneumatic process becomes of vital importance, since, without it, the leaching of the ore must necessarily absorb a great amount of time, and become very tedious on account of the absence of the oxygen required for perfect solution. The respective chemical equation in the case under consideration is as follows:

$$\text{IV.}\quad \underset{\substack{183.3\\ \text{chalcopyrite.}}}{CuFeS_2} + \underset{\substack{128\\ \text{oxygen.}}}{4O_2} + \underset{\substack{98\\ \text{sulphuric acid.}}}{H_2SO_4} = \underset{\text{copper sulphate.}}{CuSO_4} + \underset{\text{iron sulphate.}}{FeSO_4} + \underset{\text{sulphuric acid.}}{H_2SO_4}$$

and it will be seen that in this instance 128 parts by weight of oxygen are required for bringing 183.3 parts of chalcopyrite into solution, and that one-half the weight of sulphuric acid suffices for this purpose in comparison to the weight of acid employed for the leaching of chalcocite. On the other hand, two molecules of sulphuric acid are reproduced in the case of chalcocite (Equation I), while only one molecule of that acid results on treating chalcopyrite.

If we consider, now, in comparison with the points given above, the reaction ensuing with roasted chalcocite, and assume that the roasting has been carried out to perfection, so as to change all the sulphide present into oxide, the equation representing the leaching process will be as follows:

$$\text{V.}\quad \underset{\substack{79.3\\ \text{cupric oxide.}}}{CuO} + \underset{\substack{98\\ \text{sulphuric acid.}}}{H_2SO_4} = \underset{\text{cupric sulphate.}}{CuSO_4} + \underset{\text{water.}}{H_0O}$$

On examining this reaction more closely it will be seen at once that under existing conditions no addition of oxygen is required. The question, therefore, resolves itself into the consideration, what copper concerns, whether the roasting or the pneumatic addition of oxygen can be effected at less expense. We are inclined to say that of these two methods the pneumatic process deserves preference, since the roasting of chalcocite or chalcopyrite requires a continuous and hence large supply of fuel, representing a prohibitive factor for many localities, while the pneumatic procedure can be applied either without heating the air conducted into the liquid, or by warming it by means of an oven through which the air passes before entering the conduits. Even if compressed air is employed—a certain pressure being required in all cases—for the production of which appropriate machinery is required, the initial outlay caused by the construction of a plant of this character remains far below the cost incurred by the erection of a roasting furnace, which is not only a costly structure from the beginning, but also an expensive one to maintain on account of the frequent and unavoidable repairs occurring.

Time is considered as being equal to money by business men, and the majority of mechanics are paid by the hour, so that the financial point in the case under discussion represents a momentum of vital importance. It is stated, therefore, that the thorough lixiviation of a certain weight of ore is effected in twenty-four hours, and that the same result can be reached, when applying the pneumatic method, in less than half the time, the importance of the process becomes very striking and evident. In favorable cases this time is even reduced to ten, eight and six hours for complete extraction, since the excess of the free oxygen present contributes remarkably to the speediness of solution. This observation refers to copper as well as to gold and silver ores, and is supported by practical and scientific facts, which cannot be disputed.

Modern methods aim at perfection, at the avoidance of all losses, at the utilization of all by-products, and the complete extraction of values by lixiviating or cyaniding processes, and it must be well understood that none of them answers its purpose entirely as long as these points are not approximately reached. Such results are seldom accomplished from the beginning, and it is only by continuous study and observations, and the contributions of many, that a process is finally brought to that degree of perfection which is so essential for its application. The two pneumatic processes under discussion are, therefore, to be considered as most valuable additions to the knowledge already acquired, and the time will not be far distant when the producer of one or the other of the metals mentioned will not be satisfied until he has managed to add these great saving appliances to the existing machinery and implements of his plant.

OTHER ECONOMIC PROCESSES.—If we now extend our researches to the behavior of the most abundantly occurring copper ore—namely, chalcopyrite—and assume that this mineral was subjected to a "dead" roast, that is, to complete decomposition and oxidation, and the expulsion of the acids present, as shown by the equations VI, VII and VIII, it will become evident that but one molecule of sulphuric acid is required subsequently for the transformation of the cupric oxide produced into sulphate (equation V), since the ferric oxide present is not affected in the cold by dilute sulphuric acid, and is, therefore, successfully eliminated in this manner.

Results of light oxidizing roast:

$$\text{VI.}\quad CuFeS_2 + 4O_2 = CuSO_4 + FeSO_4$$

Results of dead or decomposing roast:

$$\begin{cases} \text{VII.} & CuSO_4 = CuO + SO_2 + O_2 \\ \text{VIII.} & 2FeSO_4 = Fe_2O_3 + SO_3 + SO_2 \end{cases}$$

The question of economy enters naturally into all mining operations as an essential factor, and the wasting of any by-product must necessarily appear as a defect in the process applied. It will be seen from equations VII and VIII that on roasting chalcopyrite to complete decomposition a great amount of sulphurous and sulphuric fumes are produced, which are generally allowed to escape into the atmosphere and thus go to waste. The loss ensuing in this manner might be readily avoided by conducting the acid vapors into vats containing the subdivided and previously roasted ore, besides the necessary amount of water, when the sulphurous and sulphuric acids thus formed will effect the solution of the cupric acid. The behavior of sulphurous acid, when obtained in this or the manner indicated below, will become apparent from the following considerations.

If sulphur dioxide only is produced by burning chalcopyrite on properly constructed grates, the gas evolved by the co-operation of atmospheric oxygen, admitted in abundance, consists practically of sulphur dioxide alone:

$$\text{IX.}\quad 2CuFeS_2 + 13O = 2CuO + Fe_2O_3 + \underset{\text{sulphur dioxide.}}{4SO_2}$$

This gas may be utilized either in the manner described before—that is, by conducting it into the vats filled with the crushed ore and water—or it may be introduced into the latter alone. Assuming the first mentioned method having been chosen, the metallic solution resulting will contain, besides the cupric salt produced, a certain amount of cuprous sulphite of the formula $Cu_2SO_3\ HO_2$, which represents a substitution product of sulphurous acid, two monovalent copper atoms having replaced two hydrogen atoms in the latter:

$$\text{X.}\quad \underset{\text{sulphur dioxide.}}{SO_2} + H_2O = \underset{\text{sulphurous acid.}}{H_2SO_3}$$

$$\begin{matrix} H\ H\ SO_3 \\ Cu\ Cu\ SO_3 \end{matrix}$$

or, $Cu_2\ SO_3$ cuprous sulphite.

In the second case under consideration—that is, on introducing the sulphur dioxide produced into water—sulphurous acid will be formed exclusively, which, however, decomposes, when in contact with air, and especially if exposed to sunlight, into sulphuric acid and free sulphur:

$$\text{XI.}\quad 3SO_2 + 2H_2O = 2H_2SO_4 + \underset{\text{free sulphur.}}{S}$$

Since the latter settles in the bottom of the vat employed in a finely divided condition, it represents a by-product of appreciable value, fit for medicinal purposes, if washed and dried in the proper manner. The supernatant liquid, which is drawn off into another tank, consists of a dilute solution of sulphuric acid only, which is applied for the lixiviation of the cupric oxide produced.

If we calculate, now, the amount of sulphurous acid obtainable from a ton of chalcopyrite by burning the mineral on grates and conducting the fumes into water, we will find from equation IX by introducing the atomic weights:

$$\text{XII.}\quad \underset{366.6}{2CuFeS_2} + 13O = 2CuO + Fe_2O_3 + \underset{256}{4SO_2}$$

and the proportion

$$366.6 : 256 :: 2000 : x$$
$$x = 1396$$

that 1396 pounds of sulphur dioxide can be produced, according to theory, from a ton of chalcopyrite. Since it is known, however, that the latter mineral, when subjected to burning, retains a certain percentage of sulphur at the temperature prevailing in the furnace, we will figure on the conservative estimate of 1000 pounds of sulphur dioxide per ton of

chalcopyrite. These 1000 pounds will produce, if conducted into water :

XIII. $SO_2 + H_2O = H_2SO_3$
64 82

64 : 82 :: 1000 : x
x = 1281

1281 pounds of sulphurous acid, which, according to equation XI :

$$3SO_2 + 2H_2O = 2H_2SO_4 + S$$
192 196 32

will change, on being exposed to the influence of air and sunlight, into 1020 pounds of sulphuric acid, while contributing simultaneously to the deposition of 166 pounds precipitated sulphur.

Another process for the recovery of copper from chalcopyrite appears to allow of yet greater economy, if figuring from the time when the preliminary preparation of the ore has been accomplished, and sufficient raw material accumulated to allow of an uninterrupted production of the metal. The procedure in this case consists in exposing heaps of the crushed mineral to the influence of the atmosphere for a period of two or three years, and moistening the ore bodies from time to time with water, when oxidation takes place, and the material is gradually transformed into a mixture of cupric and ferrous sulphates. The reaction ensuing under these conditions is sometimes so intense that the mass bursts into flame, so as to necessitate the addition of water to quench them, and is represented as follows :

XIV. $CuFeS_2 + 4O_2 = CuSO_4 + FeSO_4$
atmospheric hydrogen.

The copper and iron salts produced in this manner are subsequently extracted by means of water, and the solution thus resulting treated for its copper contents in the usual manner, or the liquid evaporated to crystallization, and the separation of the two compounds effected in the proper way.

Diagram for Calculating Compressed Air Pressure.

Written for the MINING AND SCIENTIFIC PRESS.

The graphic table herewith presented is intended to facilitate calculations in power transmission by compressed air. Any problem within the limits of the table can be solved by a glance without reference to the usual intricate formulas. The table is spaced on a logarithmic scale, thus giving, at the same time, large range of values with accuracy in smaller quantities. Horizontal lines show loss of pressure in pounds per 100 feet of pipe, and vertical lines show cubic feet of free air per minute. A single example will suffice to show the manner of using the table :

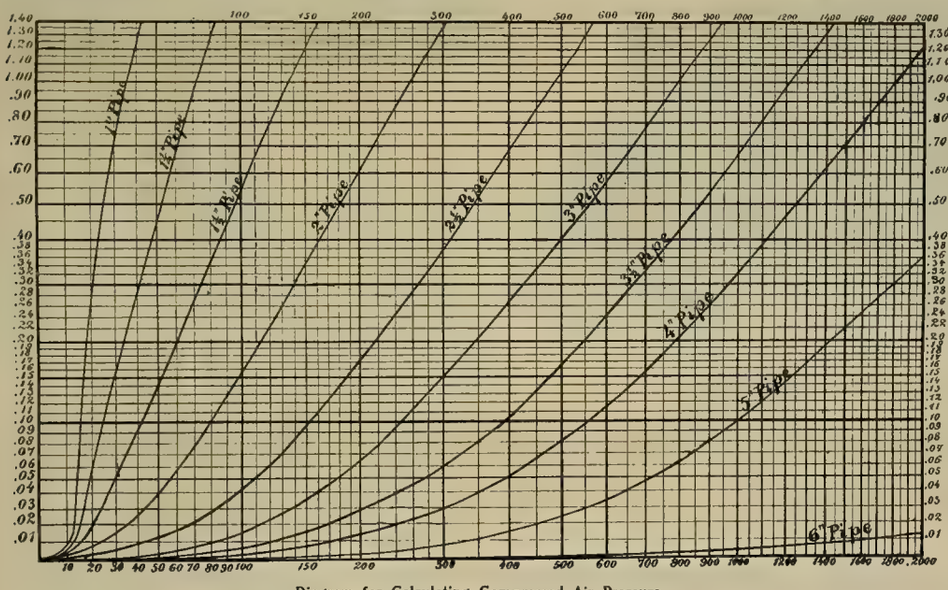


Diagram for Calculating Compressed Air Pressure.

Example : It is required to operate ten drills using 1000 feet free air per minute at a distance of 6000 feet from the compressor. The air is transmitted through 5″ pipe. What additional pressure will be required at the compressor to give 75 pounds terminal gauge pressure ?

Referring to the diagram, take the vertical line denoting 1000 cubic feet free air per minute, follow it up to intersection with curved line representing 5″ pipe ; note the horizontal line at the same intersection which denotes .10 pound, which is the additional pressure required for 100 feet of pipe; whence $\frac{.10 \times 6000}{100} = 6$ pounds, and 75 pounds + 6 pounds = 81 pounds, the gauge pressure required at the compressor.

If the air is to be transmitted through 4″ pipe, we have : $\frac{.32 \times 6000}{100} = 19.2$ pounds, and 75 pounds + 19.2 pounds = 94.2 pounds, the compressor gauge pressure required.

The Greene Con. Copper Co., Sonora, Mexico.*

[STAFF CORRESPONDENCE.]

Cananea camp, the location of the Greene Con. Copper Co., is in Sonora, Mexico, about 40 miles south of Naco on the railroad, 9 miles south of Bisbee, Ariz. At the present time a road is under construction between Naco and the camp, on which the company propose to use large freight wagons, hauled by road traction engines, pending the construction of a branch railroad, projected and now being surveyed.

The mines are situated in a range of mountains, where the company's holdings aggregate nearly 8000 acres. The highest point in the tract is 8000 feet altitude, the main camp—shown in the illustration—being at 5200 feet. Nine shafts, all now over 100 feet deep, are being continued deeper. Three of them are triple-compartment, the others two-compartment. Other development progresses through some thirteen tunnels, the shortest being 200 feet and the longest 1700 feet. Manager G. Mitchell states that ore is being taken from all these workings, and that the 400-ton smelter, described further on, is running on only such ore as is taken out in advance of the headings in development work. The copper ores are present in great variety, including the green and blue carbonates, black oxides, chalcocite, chalcopyrites and native copper. It is pronounced a first-class self-fluxing ore.

A 3-foot gauge railroad, 8½ miles long, is being built to connect all the different shafts and tunnels with the smelter. Half the length is now completed.

The present equipment of the smelter comprises two furnaces of the Mitchell type, the product being copper matte. Orders have been given for three additional furnaces of the same make, each 54x160 inches in size, which will bring the capacity of the plant up to 1300 tons of ore per day. Orders have also been given for three stands of copper converters, each 8 feet by 11 feet 6 inches, which, it is claimed, will have a capacity to turn out 6,000,000 pounds of copper per month. The converters will be installed in a steel-framed building 50x200 feet. Along with this new equipment will be three new cross-compound Corliss engines for blowers, bringing the entire blower capacity up to 70,000 cubic feet of air per minute.

The ore thus far treated at the smelter has run from 10½% to 13% copper, and it is claimed the values in silver and gold obtained are sufficient to pay operating expenses of mine and smelter. The company's holdings include an abundance of water and timber. The secretary's office is at Naco, the latter being the terminus of a branch of the Arizona & Southeastern Railroad. WASCOTT.

Naco, Ariz., March 21.

*See illustrations front page.

THE fuel wood supply of Russia is running short. The forests in some parts of the empire are becoming depleted, largely by the use of wood for fuel by railways. Peat, occurring in considerable quantities throughout the country, is proposed as a substitute. A peat-coking oven has been invented by Engineer Zigler of Oldenburg, giving a fuel of superior quality at a low cost—about one-quarter of that of firewood. Newcastle coal costs 80% more than peat, turf bricks manufactured near St. Petersburg 60%, and naphtha 58%. A peat-coking plant on the Zigler system has been built near Oldenburg. A plant is being constructed near Twer, on the Nicholas Railway, and the product will be fuel for locomotives. The total cost of the fifteen buildings, with full equipment and a branch railway line to the peat bog, will amount to $1,250,000.

This plat, showing the land and water areas during the geological periods during which oil-bearing rocks were laid down, is suggestive only. The boundaries are not intended to be absolute. There were in fact, many changes of coast lines during these periods. The rock strata formed from the sediments are not coextensive, the later (upper) beds do not everywhere overlie earlier (lower) beds of the same period. A sandstone and shale series about the middle of the series (the Chico beds of the geologists) laps over the older members nearly everywhere, making a direct contact with the old metamorphic rocks underneath all, showing that the area of submergence was greater than at the beginning. Later yet, geologically, the Tertiary series of sandstones and shales—Eocene and Neocene—are much more limited in area than the middle beds, and some land-formed beds appear, showing an area of submergence less than that which immediately preceded. The total thickness of the beds varies, increasing from the southern part of the State northward till, in the upper end of what is now the Sacramento valley, in Tehama county, their upturned eroded edges show 30,000 feet thickness. The simplest explanation would be that there was a long period of sinking movement of the areas, now the valleys and sea coast, accompanied by an uplift of the land on the axis of the mountain ranges. Later the movement was reversed. The causes of the reciprocal movements could well be the change of compressing weight made by the movement by erosion of the land into the sea. Ultimately the compensation seems to have ended, so far as the valley between the mountain uplifts was affected, and the action making the ultimate persistent uplifting tendency was determined by the Sierra Range and the sea coast. That the latter has been sinking is known, and there is strong reason to believe the Sierra has been uplifted correspondingly.

RECENTLY some mastodon bones were taken out 155 feet below the surface in Hunker creek, in the Klondike. The same placer claim has yielded mastodon bones before. The present find includes the skull, excepting the lower jaw. The two upper teeth were in place and the two lower ones were found alongside. They are excellently preserved and weigh about ten pounds each. One tusk was found in its socket, the other out but alongside. The ivory is sound and polished. Immense thigh and leg bones and the shoulder bones are intact. Only the vertebræ are needed to make a fairly complete skeleton.—Toronto Globe [The position of the bones, all being found together, would indicate that the body of the mastodon after death had been covered in place by the stream debris and that there had been no subsequent cutting away of the debris by erosion, for, if there had been, the integrity of the skeleton would have been disturbed, the bones would have been more or less washed away and scattered. Burial by debris in a torrential Alaska stream is quite rapid enough to be complete before decomposition could destroy the soft tissues and dismember the skeleton. The writer recalls a pack horse lost in crossing the Kleeheenee river on the Dalton trail. Two weeks after the body was found almost completely covered with sand and gravel. Attention is called to the discovery as confirming what this paper has maintained—the preglacial origin of the Klondike placers.]

TWO OF THE largest engines in the world weigh 370,000 pounds each. The water supply is 7500 gallons. Their length is 64 feet 8 inches. The connecting rods weigh 1700 pounds each and are made of armor steel. A man of average height could stand upright in the firebox.

Electric Locomotives.

The coal operator who opened his mine but a few years ago, and employed mules for hauling his coal, soon found that some quicker means was necessary for delivering coal to the tipple. The convenience and simplicity of electric haulage was early recognized, and the increasing demand for electric locomotives is ample evidence that they have met every requirement of the mine The necessity for locomotives of large capacity has grown with the output of the mine, but the original low and narrow entries have proved a serious obstacle to their use.

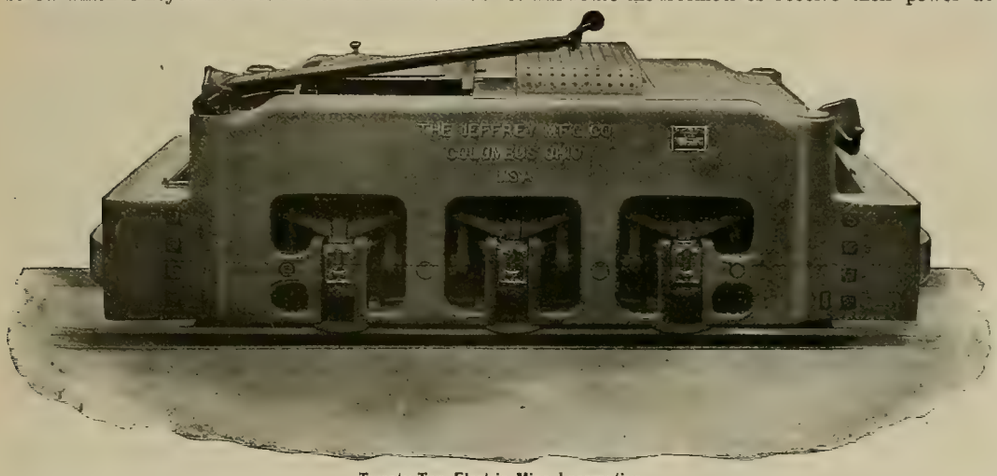
To meet the demand for a locomotive of large hauling capacity, and yet of so compact a form that it can be used in the average entry, the Jeffrey Mfg. Co., Columbus, Ohio, has brought out among its later designs the twenty-ton locomotive shown in the illustration, which the makers say is one of the largest yet built for mine use.

The manufacturers claim that the rated draw bar pull of this locomotive is 8000 pounds and that under test the locomotive developed over 11,000 pounds draw bar pull before the wheels slipped. The speed dependent on load ranges from 6 to 10 miles an hour, and the motors are of ample capacity to skid the wheels on the best track when using sand.

It is equipped with three 60 H. P. motors, each geared to an independent axle and pair of drivers. The drive wheels are pressed on and keyed to special, hammered, open-hearth steel axles. The wheels themselves are of the open-plate cast-iron type with chilled tread. The axle journal bearings are made of a very tough and durable bearing metal, and are of sufficient size to make the pressure on the journals well within the safe limit. The wheels being inside the locomotive frame, the axle journal bearings are accessible for oiling, or for renewing the linings.

The frame of the locomotive is of massive iron castings rigidly bolted together with heavy steel bolts, and supported by equalizing leaf springs, which rest in suitable chairs on the journal boxes. The frame covers are of sheet iron hinged so as to allow easy access to all interior parts of the locomotive.

The brake mechanism is very simple but effective. Pressure on the six brake shoes is equalized by a system of levers. The brakes are operated by a screw which is keyed into the hub of the hand wheel.



Twenty-Ton Electric Mine Locomotive.

No ratchets and pawls are necessary for locking this brake mechanism, as the screw makes it self-locking in any position. Sand boxes of large capacity are provided at both ends of the locomotive, and operating levers for them are placed within convenient reach of the operator.

The motors are water and dust proof. They are wound for either 220 or 500 volts. The motor frames are of cast steel. The armature shafts are made of high-grade crucible steel and bearings for both are made of the best bearing bronze obtainable, carefully bored to alignment and scraped to fit before assembling. The commutator is made of drop forged copper segments, insulated with mica.

The controller used on the locomotive is the Jeffrey Class 9. It has specially large, milled contacts, and is so arranged that the motors may be run either in series or in parallel. The resistance coils, of ample capacity, are at the top of the locomotive, and so arranged that there is a constant circulation of cool air about them. On either side of the locomotive frame is a cored receptacle for the Jeffrey Standard trolley base, which admits of the trolley pole being placed to suit the mine wiring.

Every motor used on the Jeffrey locomotives is given a full load and overload test before placing on the locomotive. After the locomotive is complete it is placed in a special testing frame and made to run the equivalent of several miles under load in both directions.

A NEW geyser has appeared near Lake Echo, Romtomahana, N. Z. It is described as a mass of boiling water, half an acre in extent, lifting in a great dome, through which a column of steam, water and stone rises 300 feet.

Power Transmission from Niagara Falls.

There are three separate transmission circuits from the Niagara power house to Buffalo, two of which are copper, and installed on the same pole line. The third circuit is strung upon a separate pole line throughout its entire length, and is of aluminum instead of copper. This aluminum line has the same resistance as each of the other two, and is composed of three cables of 500,000 circular mils each, made up of thirty-seven strands. At the present market price of copper wire it is cheaper to use aluminum for overhead lines where the conductors do not have to be insulated. The conductivity of aluminum is less than copper, and the price per pound is greater, but the volume per pound of aluminum is much greater than that of copper on account of the lower specific gravity of the metal. When, therefore, resistance per pound is taken as the basis for comparison, aluminum is found to be cheaper.

Since the long-distance service to Buffalo was started in 1896, the line has been operated at a potential of 11,000 volts; but recently the voltage has been raised to 22,000, and the capacity of the three Buffalo circuits is now 30,000 H. P., with about 10% line loss. No power is taken from the Buffalo transmission line until North Tonawanda is reached—a distance of about 10 miles—where the Tonawanda Power Company at present utilizes about 1000 H. P.

At the point where the Buffalo transmission line is tapped with supply lines for the Tonawanda sub-station the transmission line which supplies the city of Lockport with electric power is also connected. This branch line, consequently, has the same voltage, phase and frequency as the Buffalo line. Its length is about 15 miles, making the Lockport sub-stations about 25 miles from Niagara Falls. Three hundred H. P. is used by the local electric lighting company in motor generator sets, and about 600 H. P. in a rotary converter sub-station which supplies power for local electric railroad service. It is from this sub-station that the forty-ton electric locomotives are operated which daily haul heavy freight trains on this feeder to the Erie railroad, hauling at times as many as twenty-eight loaded freight cars. Since the sub-station feeds direct current for a distance of 10 miles beyond the sub-station, on certain sections of this route the locomotives receive their power at a distance of 35 miles from the Niagara power house. This is a forcible illustration of what can be accomplished by the application of electrical power to steam railroad service.—H. W. Buck in Cassier's Magazine for May.

THE Government of British Columbia is said to have made arrangements with the Con. Cariboo H. M. Co. to forward to Glasgow models of the gold bars made from the 1900 clean-ups of the mine at Bullion, and in addition an actual block of solid gold, to weigh in the neighborhood of half a ton, which will be the first clean-up of this season's operations at the mine. The expense to which the Province will be put in the matter is cost of transportation and insurance from either New York or Montreal to destination, The appearance of this ingot at Glasgow cannot fail to attract a great deal of attention, and no better way of advertising the mineral wealth of British Columbia could be possibly devised.

A RUSSIAN GOVERNMENT expert, who has investigated the fatigue of the eyes by light, says the involuntary closing of the eye (winking) is a sign of weariness. Using surfaces illuminated by various lights, he counted the involuntary movements of the eyelid, his results being that, when candle-light was used, the eyes were closed 6.8 times a minute; with gas-light, winking occurred 2.8 times a minute; with sunlight the eyes closed 2.2 times, and with electric light 1.8 times. From these facts he draws the conclusion, which seems to be corroborated by other observations, that the electric light is the least injurious to the eyesight of all varieties of artificial illuminants.

A Slow-Speed Mill.

The old, slow-working arrastra, used for crushing ore, is claimed by some mill men to be a better amalgamator than the modern stamp mill. There have been many mills built of the type of this old mill, but they have usually been fast-speed mills, running at thirty to eighty revolutions. The Lane slow-speed

The Lane Slow-Speed Roller Mill.

roller mill, a cut of which is shown, is one of the latest roller mills. It is a slow-speed mill, making twelve revolutions per minute. It amalgamates, so its manufacturers say, as well as an arrastra, and from 10% to 20% better than stamps. Its capacity is greater than that of stamps of equal cost.

The particular advantages claimed for the Lane mill by its manufacturers are the saving of a greater amount of the gold at a less expense for running and repairs, and at smaller original cost than a stamp mill of equal capacity. A 7-foot Lane mill costs less than a 5-stamp mill does, and will do work of ten stamps and much better amalgamating. It weighs less, which means a saving in freight, and can be set up for less, because it requires less grading and foundation work. Ordinarily it is run as a plain rolling mill, crushing to any desired mesh. If very fine pulp is required, it can be changed into a roller-grinding mill to crush as fine as 150 mesh. The inside of the screens can be brushed while the mill is running, and leaves, roots and chips can be removed with the hand. The space of screens in the 7-foot mill is 50 inches. The 5-foot mill is in general construction the same as the 7-foot mill, which is described in detail, but is, of course, lighter in many of its parts.

Recent Additions to Museum California State Mining Bureau.

Selenite crystals from geodes, Wayne Co., Utah.

Curiously marked argillaceous sandstone, called "town plat rock," Glen canyon, Arizona.

Auriferous volcanic tufa, Bishop Creek, Inyo Co., Cal.; Thos. Rigg.

Platinum and associate minerals, Happy Camp, Siskiyou Co., Cal.; O. C. Pope.

Rich gold quartz, Jumper mine, Tuolumne Co., Cal.; P. Geo. Gow, manager.

Hydrophane (variety of opal), a peculiar mineral which becomes translucent when soaked in water, Riverside, Cal.

"Stream tin" (oxide of tin), Dominion creek (Klondike), Yukon Territory; Arthur Bolton.

Cinnabar, recent discovery at Terlingua, Brewster Co., Texas; Judge M. H. Hyland.

Cinnabar, crystals on crystallized pyrite, H. & N. mine, Stanislaus Co., Cal.; E. P. Newhall.

Gold quartz showing free gold, Oregon & California mine, Siskiyou Co., Cal., and Gold King mine, Shasta Co., Cal.

Gold quartz showing free gold in talc, Gold Hill mine, Kelsey, El Dorado Co., Cal.; T. D. Manson.

Auriferous "ruby sand," beach at Nome City, Alaska; P. L. Wooster.

Nickel ore from Sudbury nickel mines, Canada.

Koppite (pyroniobate of cerium calcium, etc.), with magnesio-ferrite in limestone, Schelingen, Baden, Germany.

Perthite, a variety of feldspar consisting of orthoclase and albite.

Scapolite, three specimens finely crystallized, Canada.

Zircons, Zirconia, North Carolina.

Sodalite, apatite, celestite, chrysotite, arsenopyrite, actinolite, corundum, muscovite, etc., etc., Canadian localities. HENRY S. DURDEN, Curator.

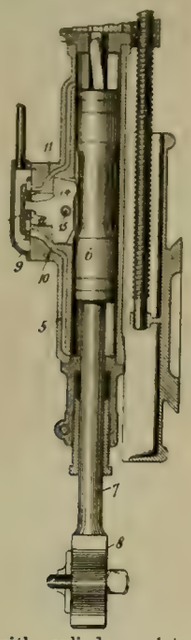
U. S. CONSUL F. H. MASON reports to the State Department a great improvement in Welsbach gas-lights made by R. Langhans, an Austrian engineer, resident at Berlin, who has discovered and perfected a chemical complex, which, added to the thoria-ceria mantle, converts it from a loose structure hardly sustaining its own weight into an elastic glass, chemically combining the constituents. The mantle is made not only stronger, but it holds the ceria to its work, maintaining the constancy of the light emission and resists the shrinkage tendency of the thoria.

Mining and Metallurgical Patents.

Patents Issued April 16, 1901.

Specially Prepared for the MINING AND SCIENTIFIC PRESS.

ROCK DRILL.—No. 671,970; H. Koch, Tarrytown, N. Y.

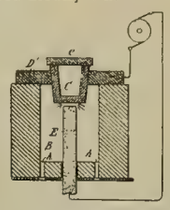


Combination with cylinder, piston, distributing slide valve, and valve operating mechanism, which operates the valve at certain points in stroke of piston, but leaves valve free to move at other periods in operation, of means for holding valve against movement, due to its weight, when drill is pointing downwardly and the valve is not held or positively actuated by valve operating mechanism but whereby valve is free to move by its own weight when drill is pointing upwardly and valve is not held or positively actuated by its operating mechanism.

ROCK DRILL.—No. 672,083; L. T. Sicka, Denver, Colo.

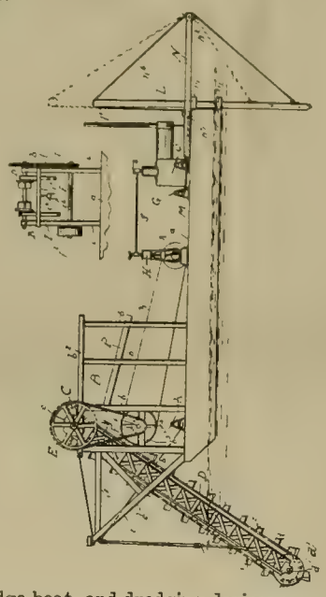
The combination of inclosing case, shaft journaled in one end, crosshead mounted to slide in case, and connected by link to crank on shaft, a U-shaped spring secured to crosshead and extending lengthwise within case, plunger rod mounted to slide within case lengthwise of and with ends between arms of spring, swiveled collar encircling neck of rod so as to permit it to rotate, and a pivoted link connection between collar and free end of spring arms.

ELECTRIC CRUCIBLE FURNACE.—No. 672,054; G. de Chalmot, Holcombs Rock, Va.



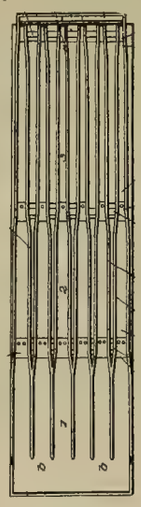
A furnace body or shell forming chamber within it, crucible suspended within chamber, the chamber being materially larger than crucible to form a heat insulating space around latter, a carbon support for crucible making circuit connection therewith, support connected to one terminal of circuit, and a carbon electrode contact with lower part of crucible and connected to other terminal of circuit and movable so that it may be fed toward crucible as it is consumed.

MINING DREDGE.—No. 672,072; W. T. Urie, Kansas City, Mo.



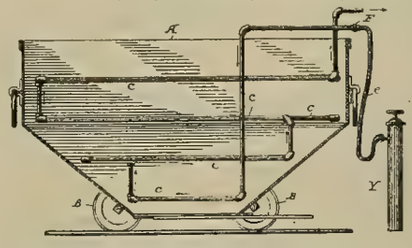
A dredge boat, and dredging devices upon forward end of boat, and boat-anchoring spud at rear end of dredge boat having a sheave at upper end, guide boxes for spud connected with rear end of boat, braces extending horizontally from rear end, and inclined at angle to sides of boat, and toward each other, and having sheave in ends, means for raising and lowering spud, and winch upon boat, and cable connected with lower end of spud and extending over the sheaves upon braces, and upper end of spud, and also connected with winch.

TROUGH CONCENTRATOR.—No. 672,298; C. A. Taylor, Leadville, Colo.



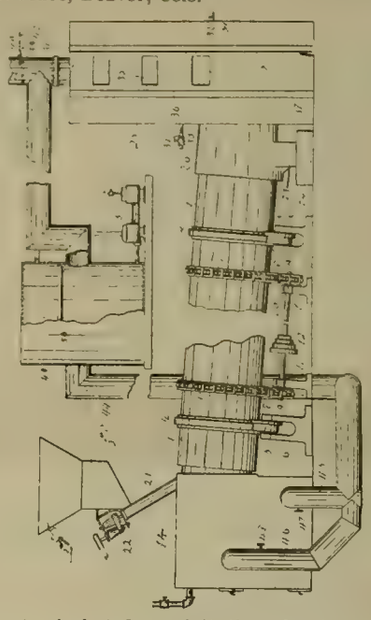
A table, series of troughs on table, each trough having side plates perpendicular to table, the side plates of each trough being relatively parallel at plurality of points throughout length of table, whereby space between such plates is greater at one end of the table than at other, outlet openings being formed in each trough between several adjoining parallel portions of side plates.

MEANS FOR COOLING ORES FROM ROASTING FURNACES.—No. 672,373; J. Jacobs, Florence, Colo.



A car adapted for reception of ore, series of cooling pipes located within body of car and so arranged that cooling medium passes first through bottom pipes and thence upward to top of car, and means for temporarily connecting pipes with a source of fluid supply.

APPARATUS FOR OXIDIZING ORE.—No. 672,065; H. C. Lawrence, Denver, Colo.



A water-jacketed precipitating chamber, hollow shelves provided with circulating plates mounted in chamber communicating with water-jacket and arranged to provide circuitous passage for vapors and gases through chamber, doors to chamber for removal of precipitated products from shelves, a chute mounted on outer wall of chamber for conveying removed product to suitable receptacle and valved pipes communicating with water-jacket.

IMPACT WATER WHEEL.—No. 672,315; W. A. Doble, San Francisco, Cal.

A composite wheel, consisting of nave of cast metal, and successive cast metal rings, one or more, secured to nave and to each other by bolts or equivalent fastenings, rings being made of metal of different degrees of tensile strength, progressing outwardly, to provide against progressively increasing strain from nave outward due to centrifugal action.

METHOD OF TREATMENT OF AMALGAM CONTAINING COPPER OR PRECIOUS METALS.—No. 671,988; J. H. Burfeind, Salt Lake City, Utah.

The method of treating amalgams containing copper and precious metals, which consists in adding sulphur to amalgam at temperature not exceeding boiling point of water, and separating from amalgam the copper sulphide formed.

Stream Tin in Alaska.

Stream tin is found in considerable quantities on Buhner creek, which enters the Anakovik river from the west side, about 3 miles from Behring sea. The occurrence is perhaps best located by stating that it lies some 10 miles east of Cape Prince of Wales, and hence very near the northwestern extremity of the continent. The stream tin is concentrated on the bedrock with other heavy materials and was found by the miners in the sluice boxes. A sample of the concentrate in one of the sluice boxes was examined and yielded the following minerals: Cassiterite, magnetite, ilmenite, limonite, pyrite, fluorite, garnets and gold. The determination of percentage by weight was as follows: Tinstone, 95%; magnetite, 5%; other minerals, 5%. The cassiterite occurs in grains and pebbles, from the microscopic in size to those half an inch in diameter; they have half-round and rounded forms. In some cases there is a suggestion of pyramidal and prismatic crystal forms. The cassiterite varies from a light brown color to a lustrous black.

A second locality of this mineral was found on the Anakovik river, half a mile below the mouth of Buhner creek. Here the cassiterite is also found with the concentrates from the sluice boxes of miners. I observed one specimen from this locality which was some 2 inches in diameter.—Alfred H. Brooks, in Science.

MINING SUMMARY.

Specially compiled and reported for the MINING AND SCIENTIFIC PRESS.

ALASKA.

A glacier is reported to be forming on the mountain back of Dawson. The ice is 12 to 15 feet thick and is making part of the town uninhabitable.

J. J. Habecker, manager of the Philadelphia Crude Ore Co., states that his people will mine crude sulphur from the crater of Mount Makushim, an extinct volcano on Unalaska island. Beds of sulphur are found at the crater of the volcano, 200,000 tons being said to be exposed in one part where hot vapors have melted the snow. It is proposed to build 20 miles of railroad from the seashore to the base of the mountain. Surveys were made last summer. Manager Habecker proposes to send a party to the mine about July 1st.

The Philadelphia M. Co., at Rampart City, Erastus Brainerd manager, is operating on Idaho bar, using machinery and a big force of men.

Quartz mining at Rampart City is beginning to receive attention. J. Langford and his partner have discovered a big ledge on Mike Hess creek. Assays show gold in paying quantities. The ledge has been traced and located a long distance. Present indications are that a stamp mill will be erected near Rampart City.

The Treasury Department at Washington is considering the appointment of D. B. Harrison of Illinois as collector of customs at Sitka, to succeed J. W. Ivey.

The Gladhough mine on Virgin bay, bonded for $60,000 by J. J. Maanach, has been developed by him. A smelter shipment, taken out of the ledge below high water line, netted about $30 per ton. A shaft has been put down 120 feet and the ledge cut by a drift from the bottom at 114 feet. It is expected the ore will run between $40 and $50 per ton. About 500 tons of ore are to be shipped at once.

ARIZONA.

GILA COUNTY.

J. A. Fleming, Pres. Black Warrior C. Co. of Globe, states that the mine will soon begin operations, handling 300 tons of ore daily. The plant consists of a leacher of 125 tons capacity, a smelter, a refinery and an acid plant.

YAVAPAI COUNTY.

E. W. Wells and W. C. Parsons of Prescott and H. McCrum of San Francisco are reported to have sold the McCabe mine at Prescott to Chicago people, F. Jager being the head of the new organization, who announces that new machinery will be bought immediately and the shaft sunk to 1500 feet. They also propose to build a smelter.

CALIFORNIA.

AMADOR COUNTY.

The Particelli mine, near Irishtown, has been bonded by J. E. Dye and associates of Jackson, who propose to begin work on it immediately. They will reopen one of the old tunnels, put on a steam hoist and sink a shaft, and will put up a mill.

L. Cassinelli of Volcano has bought the Griesbach & Mason quartz claim in Pioneer district.

BUTTE COUNTY.

The Oroville Gold Dredging & Exploration Co. has incorporated in Arizona, capital stock $500,000, to mine for gold by dredging at Oroville.

CALAVERAS COUNTY.

A rich quartz strike has been made near Mokelumne Hill. The ledge, a blind one, is about 3 feet in width and carries specimen rock. The locality, French Hill, in early days was a rich placer, and it is believed that the feeder to these gravel deposits has been found in this ledge.

The Phœnix M. Co. has bought the Merrimac gravel mine at Central Hill, near San Andreas, and have put nine men at work on it.

The Salvator G. M. & M. Co. has incorporated to mine in Calaveras county. The directors are H. C. Newman, San Francisco; F. Largomarsino, Mokelumne Hill; W. C. Ramsey, F. R. Clark, H. M. Lander, P. Taglio, O. B. Parkinson, Stockton.

It is said that the expert who examined the copper mines about Copperopolis has made a favorable report and that the Ames estate and other owners will at once start development work on a large scale.

Official reports of the Gwin Mine Development Co. for the year just past say that, though nearly 100,000 tons of ore were extracted, the shaft being no deeper, the estimates of ore reserves show 330,000 tons of ore above the 1600-foot—or lowest—level, compared with 311,500 tons a year ago, due chiefly to the unusually large development of ore on the 1600-foot level, the grade of which, thus far worked, has not averaged less than $5 per ton. The production of the mine during the present company's ownership has been to April 1, 1900, 171,748 tons of ore, which yielded $702,003.81, and from April 1, 1900, to April 1, 1901, 99,211 tons, which yielded $419,421.48, a total of 270,959 tons, which yielded $1,121,428.29. The gross profits of the year were $151,749.19, from which $120,000 was paid in dividends. The old board of directors was re-elected, with F. F. Thomas president and general manager, C. S. Benedict vice-president, D. McClure superintendent and J. J. Crawford secretary.

EL DORADO COUNTY.

S. C. Jordan of Dutch Flat, Placer county, has bonded the Clipper quartz mine at Georgetown.

At the Ford mine and vicinity, Georgetown, a deposit of rich copper ore is attracting much attention, and many claims are being located. Several transfers are said to have been made.

J. Richards is prospecting the Crown Point mine, Placerville. There is a shaft 500 feet deep on the mine.

Work has been commenced on a quartz ledge on the ranch of O. E. Hughes of Sacramento near Pleasant Valley, El Dorado county. Ore taken from it assayed $17 a ton.

FRESNO COUNTY.

Powell Bros.' copper mine, near Doyle's, is reported to show up very rich. The rock can be packed out and hauled to the railroad at Porterville for $10 a ton.

KERN COUNTY.

The 100-stamp mill of the Yellow Aster M. Co. has been started. The mill crushes 450 tons daily.

MENDOCINO COUNTY.

The Mendocino Electric Quicksilver M. Co. has incorporated at Cloverdale to work a quicksilver deposit near Hopland. The deposit is a large body of yellow ochre, rich in cinnabar. The company intends to have a furnace at the mine and to begin tunneling shortly.

MONO COUNTY.

The Sweetwater M. & M. Co., J. J. Phelan one of the principal stockholders, has bonded the Sayre mine, near Sweetwater. A contract is to be let to build a road to the mine.

The Southern Con. M. Co. has incorporated to mine the Noonday group at Bodie. J. B. Haggin, Hearst estate, J. S. Cain, A. J. McCone, W. H. Metson and J. W. Kelly are stockholders. Hoisting works will be put on the Red Cloud shaft.

NAPA COUNTY.

The D. Patten & Co.'s Silverado mine at Calistoga is shipping ten tons of ore daily to the smelter.

NEVADA COUNTY.

The Lamarque Con. mine at Grass Valley has been bonded to E. J. Caldwell and C. T. Seitz of San Francisco. They propose to put in new machinery and to sink the incline now down 300 feet deeper. The mine adjoins the North Star.——The Iron gold mine, near Newtown, has been bonded by E. Hooper and Williams Bros. of Grass Valley, who have commenced work reopening it.

A strike has been made by Buck Bros. of Moore's Flat in a claim near the Plumbago mine. They have taken out by a hand mortar several thousand dollars. They state that it is their intention to erect a 5-stamp mill on the property this summer.

PLACER COUNTY.

The Pioneer-Lynn G. M. Co. at Towles are stated to be preparing to add additional stamps to the mill. J. Sullivan is Supt.

PLUMAS COUNTY.

The Ingalls mine in Light's canyon is said to be sold to an English syndicate for $350,000.

The Glazier drift mine, on the north fork of Feather river, is reported to have been bought by J. H. Weber and associates for $10,000 and some stock. The mine is on a gravel channel running through Oak Flat which has yielded considerable gold.

It is said the Plumas-Eureka at Johnsville will be started up this summer and employ about twenty men. The mine has been leased to J. O'Brien and others. W. Metcalf will be Supt.

SHASTA COUNTY.

Charles Butters has located a claim to 50,000 inches of flow of the Sacramento river at Tunnel No. 3.

The Mountain Copper Co., Ltd., at Keswick, in their report for 1900, give the following figures: Ore extracted—1897, 165,060 tons; 1898, 221,895; 1899, 203,965; 1900, 179,694. Ore smelted—1897, 97,185 tons; 1898, 168,514; 1899, 176,689; 1900, 207,571. Copper (in matte form) produced at Keswick—1897, 7238 tons; 1898, 10,721; 1899, 10,664; 1900, 11,978. Copper produced at New Jersey Refining Works—1897, 5958 tons; 1898, 8273; 1899, 11,388; 1900, 11,443. Copper sold—1897, 6025 tons; 1898, 8273; 1899, 9647; 1900, 10,558. The report says about one-half of the property still remains to be explored, and it is estimated that (including the stocks on the surface and in process) about 1,000,000 tons of ore, likely to average about the same value as that already dealt with, is still in sight. The net profits for the year were £300,269 (about $1,500,000).

The Clover Creek Cinnabar Co., mining for quicksilver near Millville, has contracted with J. Werne and W. Morgan to run a tunnel 300 feet in length to crosscut the ore body at a depth of from 250 to 300 feet. The ore is estimated to contain from 3% to 5% quicksilver.

The Miller mill and mining property, between Redding and Middle Creek, has been sold by the Gold Reward M. Co. to the Crown Deep M. Co. The property consists of eight mining claims, the Miller's Custom Mill and the Charley Zenser Ditch.——The Trinity Copper Co. have bought the Ridge, Motion Creek, United, River and Wash Boulder placer mines, in Flat Creek mining district, the purchase price being said to be about $5000.——A rich strike is reported in the Except mine, on Clear creek, near French Gulch. It is said a tunnel is being driven in on a 5-foot ledge which carries rich values in free gold.

The Highland mine, near French Gulch, is to be reopened. M. C. Peck has bonded it and will put men on cleaning out old workings and developing.

The Phœnix mine has been bonded by C. Watson of French Gulch and W. D. Watson of Redding for six months. An engine, pumping and hoisting machinery are to be put in and a shaft sunk.

SIERRA COUNTY.

A rich strike in the Golden Era quartz mine at Sierra City is reported by the owner, T. Murphy.

SISKIYOU COUNTY.

Coal and asphaltum are found at points in Shasta valley and in the Siskiyou mountains. There is coal close to Yreka and also at Willow creek, 10 miles north. It also exists near Siskiyou, where C. Dollarhide made considerable development some years ago.

The Black Bear mine at Black Bear, it is said, will be reopened on a large scale.

SONOMA COUNTY.

At the Culver & Boer quicksilver mine, near Cloverdale, the tunnel has been advanced to 540 feet. The 1900 product was 106 flasks.

TRINITY COUNTY.

A wagon road is proposed from Delta, on the railroad in Shasta county, to Trinity Center. The distance is 10 miles and the estimated cost $20,000. It is believed the road would reduce cost of transporting ore from $20 a ton to $8 a ton, and in addition would open up a timber belt in western Shasta.

TUOLUMNE COUNTY.

The Riverside mine is being reopened by San Francisco people, C. G. Grim Supt. The company proposes, after some additional development work, to enlarge the mill from ten to forty stamps and add a cyanide plant to it.

A rich pocket, estimated to contain from $30,000 to $50,000, is reported struck in the Mountain Lily mine, Columbia. For some time the miners had been working through extremely rich ore before the pocket was cut.

The Dutch is in bonanza on the 1200 level. The shoot shows 15 feet width.

YUBA COUNTY.

The Cabbage Patch mine, near Smartsville, has been bonded by W. Billings, E. Roberts, R. Quick, W. Foote, W. Eddy, W. Argall and C. E. Clinch of Grass Valley for $30,000 on eighteen months' time and continuous operation. It will be immediately pumped out and new machinery put in. The construction of a mill is in contemplation in the near future.

COLORADO.

BACA COUNTY.

G. T. Feast, of Lamar, and other Lamar parties propose to build a matte smelter on Carizzo creek to work copper ores. The smelter is to have a capacity of from 75 to 100 tons of ore a day. After the ore is smelted the matte will be hauled to Lamar on the railroad and shipped to Pueblo. The Independence, owned by C. F. Liggett, A. J. Harker and F. B. Drew, has contracted to furnish ore for the smelter for three years.

BOULDER COUNTY.

The Texas mine, at Ward, has been bought by the Texas G. M. Co. of Montreal, Canada, for $12,500 cash. The Texas has been idle for some time. The new owners will, it is said, install a large plant, unwater the shaft, and sink 300 feet deeper.

The contractors sinking the shaft of the San Blas mine, at Ward, have made a rich strike of gold ore assaying $65 a ton.

CHAFFEE COUNTY.

The Vesper M. & M. Co., at Turret, is driving a tunnel, now in 300 feet on the vein, assays showing an average value of $12.50 per ton in gold.

The Latchaw M. & T. Co., near Buena Vista, have resumed work on the tunnel.

GILPIN COUNTY.

The Ridgewood G. M. Co. has incorporated, capital $300,000, to operate the Rialto mine, Central City. The mine has been developed by a shaft, down 600 feet, and by several levels.

Development work on the Seneca G. M. Co.'s Brooklyn mine, Central City, is to be resumed. New York parties own the stock.

H. P. Lowe and T. S. Dynes of Denver, leasing the National and Hecla mines, on Quartz hill, propose the erection of a mill in Central City. They have not yet decided the style of mill to be put in, except that it will be specially a concentrating mill.

GUNNISON COUNTY.

A find has been made in Vulcan district by M. E. Smoot, of Spencer, in working some claims on the Cebolla through the Eagle Rock tunnel. A short distance underground a blind lead was cut, assaying from 9% to 15% copper and a little gold.

HINSDALE COUNTY.

A power plant at the Henson Creek lead mines, is projected, to cost about $20,000.

The Tobasco G. M. & M. Co., Sherman, R. L. Ray manager, are having plans and surveys made for a dam and power plant.

Reports from Lake City state that rich ore bodies recently opened in the Golden Fleece are being vigorously worked, yielding large amounts of ore.——Work is soon to be commenced on a power plant at the Henson creek lead mines property, near Capitol City.

LAKE COUNTY.

The Leadville Gold Basin M. Co., of Leadville, has been incorporated; capital $500,000. It will operate twenty acres belonging to Big Four Gold-Copper Co. This ground is near the Fanny Rawlings and the Little Johnny. A 300-foot shaft has been located and will be pushed down to the ore on the north end.

The Kubera, a new proposition, is located near the Continental and G. M. Favorite, and a shaft is being sunk on it by T. L. Davis and F. X. Hogan.

Considerable attention is being given to placer mining deposits in Lake county and ground is being tested with drills.

J. W. Dixon, manager of Little Joe group, at Twin Lakes, Leadville, says the 20-stamp mill and tables will be completed.

MINERAL COUNTY.

The Big Kanawha Leasing Co.'s United mine, at Creede, in by a tunnel 8700 feet, have struck ore assaying $27 a ton at a depth of 1560 feet below the surface. The vein is said to be 5 feet in width, carrying 37% lead, .36 ounces gold and 2 ounces silver. The company propose to erect a mill.

OURAY COUNTY.

The Home pyritic smelter, at Ouray, burned down a month ago, is to be rebuilt by the owners upon larger and more modern plans than the one burned. It is expected to have the new smelter ready for operation about July 1. T. Osborne is the manager.

PITKIN COUNTY.

The Della S. mine, at Aspen, is discovered to carry cadmium in the ore. The whole face of a drift is in this character of ore and is said to assay 8% cadmium.

SAN JUAN COUNTY.

The tunnel of the Waterfall, owned principally in Silverton, is in 200 feet and the face shows from 15 inches to 3 feet of ore said to go from half an ounce to an ounce and a half in gold and from thirty to forty ounces in silver. It is said the owners propose putting in a cyanide plant this season for the treatment of the ores.

The American tunnel of the Gold King Con. M. Co., at Silverton, is in 1000 feet. Manager Kinney contemplates the enlargement of the Gold King mill by the addition of forty stamps.

TELLER COUNTY.

The new shaft of Orphan Belle, to work the Isabella at depth of 800 feet, is down 170 feet.

The Consolidated G. M. Co. and Bull Hill Consolidated Co., of Victor, have passed the dividends for April pending arrangements for consolidation of the two companies.

At the 100-foot level Little Frank S., Cripple Creek, the vein is believed to be an extension of the Joe Dandy vein.

The south drift on 700-foot level Independence is 800 feet south of the shaft and will be driven 700 feet farther. No change in the rock has been noticed. The shaft is now 1100 feet deep.

Work has been resumed on the mine of the Hilderbrand G. M. Co. at Cripple

Creek. The shaft is now down 250 feet, and it is proposed to cut a station at the 300-foot level and run laterals out to explore the ground.

Manager Harmon of the Atlanta claim of the Gilpin & Cripple Creek Co., Cripple Creek, states that a station at the 475-foot level has been started and the company propose to drive to the sidelines both east and west.

It is said work is to be resumed shortly in the United Mines Transportation tunnel. The bore is now close on the territory of the Coriolanus, and will cut it down 628 feet.

Parks & Berger, leasing block No. 1 of the Black Belle Co.'s property, at Victor, are driving for the ore shoot on 200-foot and 300-foot levels and producing excellent ore from the 150-foot. They shipped forty tons recently. The lessees have about 35 feet of work yet to reach the ore shoot in the two new levels.

J. Barbee, leasing on the Columbia claim of the Cripple Creek Columbia Co., has shipped twelve tons of ore estimated at eight ounces per ton. The ore is from winze from 340-foot level.

Manager Timmis of the Contact G. M. Co., at Cripple Creek, says they will immediately sink the shaft on the Don claim 250 feet deeper. The depth is now 165 feet.

The Clyde G. M. Co. has completed the 800-foot station and is installing a pump of 500 gallons per minute capacity. Sinking is to be continued to the 1000-foot level.

The shaft on the Comstock of the Solitaire Co. is down 50 feet, showing a 4-foot vein of the average value, it is claimed, of more than $20 per ton.

The Leclair G. M. Co. has been incorporated at Cripple Creek. The officers are: President, A. Sharpe; secretary and treasurer, C. A. Gill. The company owns the Poor Man Extension, Lady Josephine and Quaker Asp. The Poor Man Extension is to be worked on company account.

The Independence ore shoots in the upper levels are reported to have been opened in the 900-foot level.

The Hoosier shipment of fifty tons from Tenderfoot hill, Cripple Creek, is reported to have returned values of $183 per ton.

IDAHO.

KOOTENAI COUNTY.

L. Wagner, of St. Paul, Minn., who has examined the mine of the Harrison M. Co., at Harrison, says the company will put in a stamp mill this summer.

The Idaho G. & C. M. Co. are putting machinery on their claim in the Wolf Ledge district, near Cœur d'Alene. E. L. Abrams is superintendent.

It is reported that the ledge from which the gold on the Tyson placer claim—the new strike east of Tekoa, Wash.—is supposed to have come, has been found on their claim. The gold taken out has been rough and unwashed. R. Neill, of Tekoa, has bought the claim, paying, it is said, $9000.

LATAH COUNTY.

The Jerico M. & M. Co., Kendrick, will build a road to its property on Gold creek. Machinery for development will then be taken in.

Placer mines in Gold Creek district are working with a good water supply. There is more placer work being done this season in that district than in recent years.

LEMHI COUNTY.

The International G. M. Co., a Vermont and Quebec corporation, is developing the Mastodon group, a gold-copper mine on Lost creek, near the north fork of the Salmon river. The vein outcrops 15 feet wide, and if the results continue favorable, a concentrating plant will be installed.

OWYHEE COUNTY.

Capt. J. R. DeLamar has brought an action against the DeLamar M. Co., at DeLamar, for $300,000. The charge is infringement on a patent on the cyanide process by using zinc dust as a precipitant. The allegation is made that 75,000 tons of ore have been treated, and $1 royalty a ton is asked and $225,000 for damages. The suit is a test case. If DeLamar wins, similar actions will be brought against a number of other companies.

SHOSHONE COUNTY.

It is reported that J. Gaffney is working on the Ozark mine, Prairie City, getting out a mill run of ten tons to find the value saved by ordinary mill process. If results are satisfactory he will build a mill immediately.

MICHIGAN.

HOUGHTON COUNTY.

Calumet & Hecla is reducing 4500 tons of rock daily. The trap rock underlying the Calumet lode is now being mined and stamped. It is positively denied that the Calumet & Hecla Co. have any connection with the copper trust.

The Tamarack and Osceola companies at the opening of lake navigation last year had 7000 tons of refined copper on the docks. There are now but 300 tons. This is the first time in the history of Lake Superior copper mining that the docks were so bare of copper at the opening of navigation.

President J. Stanton, of the Mohawk M. Co. says: The new Mohawkite vein is 50 feet long, from 6 inches to 3 feet in width, and runs at least 600 feet from the surface diagonally downward. There are at least 3000 tons of this ore in sight.

MONTANA.

BEAVERHEAD COUNTY.

G. W. and A. French have shipped twenty-five tons of high-grade ore to the smelter from the Gold Finch and Dolphin mines, near Argenta, and expect a return of $100 per ton.

CASCADE COUNTY.

The Missouri River Power Co., owning a dam and power plant at Canyon Ferry, and now constructing a pole line to Butte, will build another dam across the Missouri river at Stubbs' Ferry, 5 miles below the present plant. The new dam and plant are to cost $1,000,000 and will develop 10,000 H. P., which will be sent to Butte. The company has contracts for power from the Amalgamated and other big companies operating in Butte.

FERGUS COUNTY.

The Spotted Horse mine is shut down to install a cyanide plant.

It is reported that Finch & Campbell will take up their bond on the Kendall mine, North Moccasin, and build the largest cyanide mill in Montana. It is said that they have bought the water power on Warm Spring creek and will put in an electric power plant, transmitting power to the mill, about 5 miles, and also a pumping station and a pipe line for water supply.

The Spotted Horse mines, near Lewistown, have been bought by the Central Montana Mines Co. for $130,000, the first payment of $30,000 being made. The Spotted Horse group has already produced several millions of bullion, and then suspended because of lower ore values not paying with the old costly methods of milling. Last season the reopening of mine and 20-stamp mill was begun and the Johana M. Co. organized. The mill had been repaired and was being prepared to start when the Central Montana Co. bought it.

FLATHEAD COUNTY.

The Fisher Creek M. Co. propose to increase their mill near Libby from ten to forty stamps. A turbine of 100 H. P. will be put in. G. Berrien is manager.

JEFFERSON COUNTY.

The Cataract C. M. Co., to mine claims in the Cataract mining district, has been incorporated with a capital of $2,500,000; M. L. Hewitt, manager.

LEWIS AND CLARKE COUNTY.

The litigation between the Amalgamated C. Co., and H. M. Parchen over forty acres of land in Kenwood will, it is said, be settled out of court, and the Amalgamated Co. will at once start development of the ground.

J. J. Grady of Helena has bonded the Christiana mine in Greenhorn gulch. Mr. Grady intends to install a boiler and hoist and commence sinking.

M. Mitchell and T. Hird have bonded and are working on a copper mine at Old Blackfoot City, prospecting the surface to determine the best place to sink the shaft. ——The copper properties on the head of Snowshoe are attracting the attention of Spokane and Butte parties.

The Silver King mine, on the Ellis Fork of the Blackfoot, will be reopened by Peterson & Co.

MADISON COUNTY.

A shaft is down 300 feet on the Mountain View, near Twin Bridges, and a vein 25 feet wide is struck. It is claimed there is 6 feet of 10% copper ore, carrying some gold. J. C. Johnson, A. Johnson and E. C. Baxter of Butte are the owners.

Cutler, Morris, Wilkinson & Champlin of Whitehall have leased the Alaska mine.

SILVER BOW COUNTY.

The Boston & Montana Co. are asking the court to increase the bond of the Montana Ore Purchasing Co. in the Pennsylvania mine case from $950,000 to $1,250,000.

A new copper vein in the Anaconda mine has been found on the 1400 level. The discovery was made in a crosscut about 100 feet south of the stopes.

NEVADA.

CHURCHILL COUNTY.

A copper smelter is projected by Denver people in Churchill county for the Bell Mare Copper & S. Co., which they own. H. H. Barbee, manager, is to make the arrangements for the erection of the smelter.

ELKO COUNTY.

The Dexter Co., of Tuscarora, product for March was: Gold bullion, $9000; and cyanide cleanup, $3000.

HUMBOLDT COUNTY.

J. C. Pierson is developing a sulphur proposition at Humboldt House.

LINCOLN COUNTY.

D. P. Doak and J. Schrader have bonded the Keystone mine, near Goodsprings, and are reopening the old workings.

Goodsprings, April 18.

Manager P. Ryan of the Golden Star, at De Lamar, and his Eastern associates, have bought interests in the Jim Crow No. 2 and Naiad Queen mines, adjoining the De Lamar company's domain at De Lamar. Seven-eighths of the first and five-eighths interest in the second were taken on a basis, it is said, of $50,000.

NYE COUNTY.

The 2-G and some other claims at Tybo are said to have been bought by the Tybo M. & R. Co., V. Barnd manager.

WHITE PINE COUNTY.

The Rocco-Homestake M. Co., of Salt Lake City, have recently had their mine at Galena examined by P. J. Donahue, who is said to have reported favorably and recommending the sinking of a new shaft.

WASHOE COUNTY.

At the Reno Star the ledge has been found and the owner, G. Wedekind, says it has been explored in width for 150 feet without signs of wall. The ore, he says, is pebbly in character, cemented with horn silver.

Sixteen men are working in the Reno Star and a carload is being shipped daily.

NEW MEXICO.

BERNALILLO COUNTY.

On the Star mine at Bland the Navajo Co. is using two air compressors and making much development, blocking out large bodies of ore.

COLFAX COUNTY.

The Golden Era M. & M. Co., Elizabethtown, have elected M. R. Baker president, F. L. Mulky secretary, and D. B. Loy treasurer. The company have their mill nearly completed.

The tunnel being run into Baldy mountain, Elizabethtown, by the Gold & Copper Deep Tunnel M. & M. Co. is now in 300 feet. The work is being done to reach copper deposits that are believed, from surface indications, to exist in this mountain.

GRANT COUNTY.

The Husten & Thomas group at Pinos Altos has been bonded by W. Kent and H. L. Hollis, Chicago parties. Twelve men are working under F. J. Buck, in charge as foreman.——E. Baker is doing development work, sinking and drifting on the Gold Coin mine at Hanover. The ore—a copper sulphide—is largely a concentrating proposition, and Mr. Baker is making tests to get the best method of treatment.——F. G. Cline is said to be successfully treating tailings from the Gold Hill mill, at Hanover, by the cyanide process, recovering about 70% of the value.

OREGON.

BAKER COUNTY.

A rich strike on the 160-foot level of the Perry mine, Baker City, has been made. The ore body is 5 feet wide and is said to average $60 per ton. The mine is owned by J. W. McCoy and G. S. Wilson of Chicago.

The Brazos M. & M. Co. has incorporated, to exploit a mine near Baker City; capital, $1,000,000.

A strike has been made in the Texas, Iowa & Oregon mine, on the North Powder river, about 27 miles north of Baker City. The mine is owned by B. F. Colley and G. S. Howland.

The Leo, in the Alamo district, is being experted by representatives of an English syndicate. If the report is favorable and the mine bought, $100,000 is to be expended on it this season.——Eastern people have bonded the Climax and say the purchase money, $150,000, will be paid within thirty days.——Milwaukee men have bonded the Blue Bird for six months at $50,000.——L. Delome, of Montreal, Canada, representing stockholders, and Leon Shoier, a French mining engineer, have examined the Richmond.

GRANT COUNTY.

It is reported that the Cougar mine, at Granite, has been sold for a large sum. It is owned by Larkins & Evans of Spokane, Wash.

JACKSON COUNTY.

The Sterling Placer, Ashland, is running with a big clean-up in sight.——On Foot's creek Stansell & Co. have hydraulicked a large area; coarse gold and some nuggets are yielded by this mine. This company, having a timber tract at the mine, propose to put in a sawmill at Woodville, the nearest railroad town.——The Ashland mine has a hoisting and pumping plant on the 250-foot level and a full crew of men is employed. The base ore is shipped to the smelter.——It is reported a recent shipment to the smelter from the Reader mine, in Ashland Creek canyon, returned about $60 gold per ton.

JOSEPHINE COUNTY.

A strike has been made at the Mountain Lion quartz mine, Missouri Flat district, near Grant's Pass. The mine is owned by L. L. Jewell, C. E. Harmon and G. and J. Bailey.

Hoffman & Pool, of Grant's Pass, developing the Archer ledge, in Thompson Creek district, near Grant's Pass, have taken out of ten tons of ore $600.

SOUTH DAKOTA.

PENNINGTON COUNTY.

The Spearfish M. Co., operating claims in Deadwood district, has been working about three months, taking out, it is said, about $20,000.

UTAH.

BOX ELDER COUNTY.

The Copper Mountain mine, near Tecoma, Nev., E. G. Tuttle manager, is having the Bingham C. & G. M. Co. smelt several hundred tons of ore. The group was bought about three years ago by the Lewissohns of New York for $149,000. Recently negotiations for a sale to the Bingham Co. were begun. According to New York statements, the Copper Mountain group is to be taken into the Bingham consolidation for $500,000.

JUAB COUNTY.

The Godiva, at Tintic, is working fifty men and is prospecting in new ground.

The Centennial-Eureka M. Co. is to construct a $300,000 smelter at Tintic. The plans, made by G. K. Fischer of Salt Lake City, provide for 400 tons daily capacity.

The Humbug silver mine, at Tintic, has been bought by J. E. Dubois, of Dubois, Pa., and E. W. Center, of Salt Lake City.

PIUTE COUNTY.

Ogden and Salt Lake parties have incorporated to develop the Cyclone, Champneys, Monitor and Black Diamond claims in this county; capital $5000; T. Champneys of Ogden is Pres. and C. Hilton of Salt Lake City is Sec.

SALT LAKE COUNTY.

The Northern Light, Grizzly and Fairview mining claims at Bingham have been bought by the United States M. Co. for about $50,000.

SANPETE COUNTY.

The May Queen M. & D. Co. has incorporated at Gunnison to operate the El Paso and May Queen, in the Goose Creek district. The incorporators are F. M. Strong, C. B. Seldomridge, F. B. Tiffany, of Colorado Springs.

SUMMIT COUNTY.

The Century and West Century M. Cos. have executed an agreement terminating their conflicts and the suits are to be dismissed.

TOOELE COUNTY.

The Geyser-Marion, Rover, Silver Lode and Gold Dust group, at Mercur, are proposing to consolidate. The intention is to have R. C. Gemmell, State Engineer, survey the territory of the proposed consolidation, then to make an examination of the ore bodies now exposed in each group.

UINTAH COUNTY.

The Colorado-Grande Dev. Co., capital $125,000, has been incorporated in Denver to mine manganese iron ore 12 miles south of Little Grande, where it owns 1140 acres. D. C. Dodge is president and E. T. Wolverton, vice-president and general manager. It is said the latter in prospecting for copper found an enormous deposit of manganese iron. There are also said to be coal deposits near by. A line for a branch railroad from Little Grande to the iron and coal fields is being surveyed. Four carloads of the ore have been shipped to steel works and the analysis made by them is stated to be:

Iron	0.8
Phosphorus	.011
Silica	4.35
Manganese	42.65
Lime	12.21

WASHINGTON COUNTY.

An additional payment of $15,000 has been made on the Dixie mines and smelter at St. George, making the amount now paid $75,000, and reducing the balance to $125,000. The final payment of $50,000 is to be made on June 20th. At present the smelter is running on excellent ore, while at the mine the opening up of the ore bodies at greater depth continues.

WASHINGTON.

FERRY COUNTY.

The entire mill plant of the Republic is now running and 150 tons are treated daily. As the mill wears to place, the speed will be increased and it is then expected to mill 200 tons.——The shaft on the Mountain

Lion, Republic, is down 670 feet, and will be carried down to 725 feet. Stations will be cut at the 600 and 700 foot levels. Crosscuts will be made to the ledge and the vein drifted upon and opened for stoping. There is claimed to be 12,000 tons of broken ore in the shoots and several thousands on the dump. Manager J. S. Wyatt has gone to Portland, Or., to consult with the company.——The Flag Hill, Republic, has been developed several hundred feet by tunnels. A 50-foot winze has been sunk from the tunnel level and drifts extended for about 350 feet. A winze is being sunk about 190 feet from the intersection point of the tunnel. The ledge is 6 feet between walls, the ore body from 4 to 5 feet. The ledge is believed to be the east and west ledge found in the Chespa-Blue Jay, Morning Glory and El Caliph claims.

The Chico shaft, at Republic, is to be put down 100 feet deeper before further drifting on the ledge. The ledge is said to be 6 feet wide, carrying ore averaging $30 per ton.

OKANOGAN COUNTY.

The Rossman Co. is said to have bought a mill of 100 tons daily capacity for the Wauconda. The tunnel is in 675 feet and has passed through 42 feet of the ledge.

STEVENS COUNTY.

W. F. Stevens, superintendent of the Acme group, has returned to Kettle Falls from San Francisco and says a compressor, drills and steam engine will arrive and be placed in position at once. Mr. Stevens intends putting a large force at work. The Acme group is owned by the Northwest M. Co. of San Francisco. Barclay Henley is president; C. E. Finkam, vice-president; and W. A. M. Van Bokklen, secretary.

WYOMING.

CARBON COUNTY.

The Burlington C. M. Co. has incorporated to mine four claims in Grand Encampment district. Directors are M. B. Camplin, New Castle, Wyo.; J. Wagoner and W. L. Sill, of Encampment; C. B. Camplin and H. G. Camplin, New Castle.

FOREIGN.

BRITISH COLUMBIA.

The Fisher Maiden-Troy Mines, Ltd., has incorporated to work the Fisher Maiden group, near Silverton. Work will be resumed about May 1st. C. H. Fisher, Rossland, is the organizer of the company.

A rush is being made to new placer discoveries in the Boundary district, on Rock creek, below White's bar.

On the Sunset, in Deadwood, Boundary district, some record-breaking shaft sinking is being done under contract by twelve men. Supt. H. Johns reports that in twenty-five days the shaft was sunk 110 feet. It is down 320 feet. The shaft is double-compartment, each 4½x5 feet in the clear.

B. Rea reports that the Tammany group, Rossland, will be started up. The control of the company has been bought by Saginaw, Mich., capitalists.

W. Y. Williams, Supt. Miner-Graves properties at Rossland, states that tenders have been asked for a forty-drill compressor and a hoist capable of handling 1300 tons daily for the Phœnix group.

The report of the Ymir Gold Mines for the year 1900 states that during the year the company added a 40-stamp battery to its stamp capacity and paid for it out of the year's profits. The directors report that, charging off £5605 for development, depreciation, cost of additional machinery and repairs to the old 40-stamp battery, a net profit of £30,928 remains. Concerning development, the report says the Ymir shaft has reached a depth of 258 feet below No. 3 level, or about 650 feet below the surface. The 1000-foot adit level is in 506 feet and is advancing 125 feet per month, and should reach the vein by the end of the current year, some four months before it is possible to work out reserves above No. 3 level. The vein above No. 3 level is reported wider than originally calculated. The question of applying the cyanide process for the treatment of the mill tailings has been considered, tests having been made with satisfactory results, and a ten-ton plant should now be in operation.

MEXICO.

The Ramona mine, at Galiban, Sonora, has a 4-foot ledge of high-grade silver ore exposed for stoping by a 300-foot shaft and 600 feet of drifts. It is equipped with a steam hoist and a 10-stamp mill; J. D. Fresh is Supt.

NEW ZEALAND.

Thirty-four men are employed on hydrulic sluicing claims in the Livingstone Goldfield, Otago, about 40 miles from Oamaru. The first dredger in that district is approaching completion and will operate near the mining reserve opposite Livingstone Township.

Personal.

E. M. BIND of San Francisco has gone to Mexico to examine mines.

J. RICHARDS has returned to San Francisco from Washington, D. C.

W. H. JEFFREY has resigned as manager Sunset mine, Whitewater, B. C.

W. F. ENGLEBRIGHT of Nevada City, Cal., is visiting in San Francisco.

G. W. GRAYSON, who has been visiting Boise, Idaho, has returned to San Francisco.

JNO. C. RALSTON, mining engineer of Spokane, Wash., is visiting in San Francisco.

L. G. CLOUD, manager La Democrata mine, Cananea, Sonora, Mexico, is in New York.

C. S. MARINER, manager Dewey Con., Grangeville, Idaho, is visiting Spokane, Wash.

F. R. CULBERTSON, manager Tiger-Poorman mine at Burke, Idaho, has resigned.

J. A. FLEMING, Pres. Black Warrior C. Co. of Globe, Ariz., is in Philadelphia, Pa.

M. D. KELLY has accepted the superintendency of the Old Bonanza mine, Sonora, Cal.

J. W. DOWNING, Supt. Downing Con. G. M. Co. at Hornbrook, Cal., is in San Francisco.

LEWIS SEARING of the Denver Engineering Works, Denver, Colo., is in New York City.

J. T. WATERHOUSE, manager Con. Golden Trout M. Co., Lumpkin, Cal., is in San Francisco.

D. B. HUNTLEY, manager DeLamar M. Co., DeLamar, Idaho, is visiting Boise, in the same State.

MM. A. FARISH has returned to Denver, Colo., after several months' absence on professional business.

B. S. REVETT, manager North American G. Dredging Co., Colorado, is in Mexico, examining mines.

J. E. BEVERIDGE of Salt Lake City, Utah, has gone to Mexico to examine mines for Eastern people.

JAS. W. NESMITH, Pres. Colorado Iron Works, Denver, Colo., has returned from a brief sojourn in California.

CAPT. JOHN GRAY of Spokane, Wash., manager of the Crystal mine, has returned from a visit to Eastern points.

H. E. WHIPPLE, who has been at Torres, Mexico, for some months, has returned to Salt Lake City, Utah.

THOS. OSBORNE, manager of the Home Pyritic Smelter, Ouray, Colo., has returned from a visit to New York.

GEO. H. EVANS has bought 16,400 feet 5-inch pipe for use this season in his hydraulic operations at Breckenridge, Colo.

JACOB E. BAMBERGER has been elected Pres. Daly-West M. Co., Park City, Utah, taking the place of the late R. C. Chambers.

GEO. MCGILLIVRAY of San Francisco goes to Dawson, N. W. T., early in May to accept a position with a hydraulic mining company.

GEO. E. AMES, the San Francisco representative of Fraser & Chalmers (Inc.), Chicago, Ill., has returned to this city from the East.

CHARLES BUTTERS, managing director Minas Prietas Red. Syn., has been visiting the cyanade plant of the company at La Colorado, Sonora, Mexico.

J. A. KIRBEY, Supt. Daly-West, at Park City, Utah, has been appointed to similar position with the Diamond Con., at Tintic, in the same State.

THOS. J. BARBOUR of the Risdon Iron Works, San Francisco, returned from Nova Scotia as far as Denver, Colo., last week and went thence to Washington, D. C.

Recently Declared Mining Dividends.

	Payable.
Lightner G. M. Co., Cal., 5 cents per share	April 20
Bald Butte M. Co., Montana, monthly, 6 cents per share, $15,000	April 20
King G. M. Co., Colo., $28,105.50	April 20
Homestake M. Co., S. D., regular 25 cents per share, extra 25 cents per share, $315,000	April 25
Gold Coin M. Co., Colo., monthly, 3 cents per share, $30,000	April 25
Doctor-Jack Pot M. Co., Colorado, monthly, 1 cent per share, $29,000	April 27
Con. Mercur G. M. Co., Utah, quarterly, 12½ cents per share, $125,000	May 1
Utah Con. M. Co., Utah, $1.25 a share, $375,000	May 1

Commercial Paragraphs.

THE Colorado & Southern Railway has issued an excellent railroad map of Colorado.

A. J. VAN DRAKE, expert machinist, on May 1st will move from his present location to the new building, 308 Mission St., San Francisco, Cal.

THE Pacific Engineering Co. has been organized to do general mining and metallurgical engineering. H. T. Brown and Clarence S. King are the managers and they have opened an office at 325 Montgomery street, San Francisco, Cal.

F. L. SMIDTH & CO., 66 Maiden Lane, New York City, engineers and builders of cement manufacturing machinery, have received the contract for equipping with Davidsen patent tube mills the plant of the Iroquois Portland Cement Co., now being built at Caledonia, N. Y.

THE Colorado Iron Works, Denver, Colo., are furnishing a 42x150 copper matte furnace for the Guggenheim smelter, at Aguas Calientas, Mexico; and a set of water jackets for the East Helena, Montana, plant of the American Smelting & Refining Co.

WM. B. SCAIFE & SONS, Pittsburg, Pa., have received a contract from Spang, Chalfant & Co., for extensive additions to their Etna Tube Works. A number of large steel frame buildings covered with corrugated iron will be erected, involving a heavy tonnage of structural material.

GEO. W. PENNINGTON SONS, Inc., have removed their office and branch works to 313 Folsom St., San Francisco. The main works remain at S.W. corner Montgomery and Chestnut Sts. They have recently added very large steam hammers, and have made other improvements, which enable them to make iron or steel forgings up to 30,000 pounds in weight.

List of U. S. Patents for Pacific Coast Inventors.

REPORTED BY DEWEY, STRONG & CO., PIONEER PATENT SOLICITORS FOR PACIFIC COAST.

FOR THE WEEK ENDING APRIL 16, 1901.

672,344.—SNATCH BLOCK—Amundson & Knight, Blue Canyon, Wash.
672,401.—BICYCLE SUPPORT—R. Axel, S. F.
672,256.—MOTIVE POWER—G. A. Bobrick, Los Angeles, Cal.
672,257.—REFRIGERATOR—G. A. Bobrick, Los Angeles, Cal.
672,309.—LOCATING MINERALS—F. H. Brown, Los Angeles, Cal.
672,413.—GOLD-SAVING APPLIANCE—T. J. Burke, Los Angeles, Cal.
672,075.—STEERING GEAR—E. H. Cowart, S. F.
672,315.—WATER WHEEL—W. A. Doble, S. F.
672,186.—GAS GENERATOR—J. T. Edwards, Weaverville, Cal.
672,187.—GAS GENERATOR—J. T. Edwards, Weaverville, Cal.
672,320.—COUNTERBALANCE—R. E. Ford, Pasadena, Cal.
672,321.—BADGE—F. Frazier, Scottsdale, A. T.
672,406.—DESK TELEPHONE—H. Herbstritt, S. F.
672,371.—JAR CAP SEALER—W. L. Ingram, Wilderville, Or.
672,131.—TYPE JUSTIFYING—Lena A. Merrill, Riverside, Cal.
671,973.—GOLD-SAVING APPARATUS.—W. Moberry, Oceano, Cal.
672,328.—NIGHT LAMP—H. Moller, S. F.
672,132.—NUT LOCK—Morgan & Main, San Jose, Cal.
672,242.—GARBAGE FURNACE—J. C. H. Stut, Oakland, Cal.
672,248.—FLOUR BOLTING MACHINE—C. L. White, Dayton, Wash.
34,378.—DESIGN—J. Ewing, S. F.

Obituary.

THOS. TENNENT, one of the pioneers of San Francisco, coming before the discovery of gold, died in San Francisco on the 22nd inst. His first public work was as surveyor of the city under W. M. Eddy. In 1864 he began the publication of "Tennent's Nautical Almanac and Tide Register," which he continued for many years, and his tide and rain tables were considered of such value that they are still in use.

Trade Treatises.

The Thompson & Boyle Co. have issued an attractively prepared catalogue of the Lane slow-speed roller mill, which can be had on application to Thompson & Boyle Co., 1101 North Main street, Los Angeles, Cal.

Latest Market Reports.

SAN FRANCISCO, April 25, 1901.

SILVER—Per oz., Troy: London, 27⅜d (standard ounce, 925 fine); New York, bar silver, 59½c (1000 fine); San Francisco, 59⅜c; Mexican dollars, 50c San Francisco, 48½c New York.

COPPER.—New York: Lake, 1 to 3 casks, $17.25; carload lots, $17.00; Electrolytic, 1 to 3 casks, $16.75; carload lots, $16.62½; Casting, 1 to 3 casks, $16.75; carload lots, 16.62½. San Francisco: 18. Mill copper plates, 20c; bars, 22@23c. London: £70 11s 3d per ton.

LEAD.—New York, $4.37½; Salt Lake City, $4.00; St. Louis, $4.27½; San Francisco $4.90, carload lots; 5½c 1000 to 4000 lbs.; pipe 6, sheet 6½, bar 5½c; pig, $5.25. London, £12 7s 6d per ton=2.78½ cents per lb.

Lead is selling in London from 1½ to 1⅝ cents per pound lower than in New York. Sales in New York for foreign orders are made at this difference below domestic rates.

SPELTER. — New York, $4.20; St. Louis, $3.75; London, £16 2s 6d per ton =3.58½ cts. per lb; San Francisco, ton lots, 5½c; 100-lb lots, 6c.

ANTIMONY.—New York, Cookson's, 10c; Hallett's, 9c; San Francisco, 1000-lb lots, 12c; 300 to 500 lbs., 13@14c; 100-lb lots, 15@18c.

IRON.—Pittsburg, Bessemer pig, $17.25; gray forge, $16.50; San Francisco, bar, per lb., 2.65c in small quantities.

STEEL.—Bessemer billets, Pittsburg, $24; open hearth billets, $27.00; San Francisco, bar, 7c to 12c per lb.

TIN.—New York, pig, $26.00; San Francisco, ton lots, 28c; 1000 lbs., 28½c; 500 lbs., 28½c; less, 29c; bar tin, ℔ lb, 32½c.

QUICKSILVER. — New York, $51.00 large lots; London, £9 2s 6d; San Francisco, local, $47.00 ℔ flask of 76½ lbs.; Export, $45.00

MAGNESIUM.—New York, $2.90 ℔ lb.; San Francisco, $3.75.

ZINC.—San Francisco, 5½c; slab, 5¾c; bar, 7c; zinc dust, N. Y., 8c.

BABBITT METAL.— San Francisco, No. 1, 10c.

SOLDER. — Half-and-half, 100-lb. lots, 18c; San Francisco, Plumbers', 100-lb. lots, 15c.

PHOSPHORUS. — F. o. b. New York 50@60c ℔ lb.

FERRO-MANGANESE. — Pittsburg, 80%, domestic, $62.50, large lots.

TUNGSTEN.—New York, ℔ lb., 95c; San Francisco, $1.15.

FERRO-TUNGSTEN. — New York, 37%, 32c; San Francisco, 65c (60%).

NICKEL.—New York, 50@60c ℔ lb.

PLATINUM.—San Francisco, crude, $22 ℔ oz.; New York, $22 per Troy oz

ALUMINUM.—New York, No. 1, 99% pure ingots, 35c; No. 2, 90%, 30c to 35c.

POWDER.—F. o. b. San Francisco: No. 1. 70% nitro-glycerine, per lb., in carload lots, 15½c; less than one ton, 17½c. No. 1*, 60%, carload lots, 13½c; less than one ton, 15½c. No. 1** 50%, carload lots, 11¾c; less than one ton, 13¾c. No. 2, 40%, carload lots, 10c; less than one ton, 12c. No. 2* 35%, carload lots, 9½c; less than one ton, 11½c. No. 2** 30% carload lots, 9c; less than one ton, 11c. Black blasting powder in carload lots, minimum car 728 kegs, $1.50 per keg; less car lots, $2 per keg.

CAPS.—3x, $5.50 per 1000; 4x, $6.50; 5x, $8; Lion, $9, in lots not less than 1000.

FUSE.—Triple tape, $3.60 per 1000 feet; double tape, $3.00; single tape, $2.65; Hemp, $2.10; Cement No. 2, $3.00; Cement No. 1, $2.65, in lots of 3000 feet and up.

CANDLES.—Granite 6s, 16 oz., 40s., 10¾c ℔ set; 14 oz., 40s., 9¾c.

CHEMICALS.—Cyanide of potassium, 98%-99%, jobbing, 32½@33½c ℔ lb.; carloads, 30@31c; in 10-lb. tins, 40c; sulphuric acid, in carboys, 66% B, 2c ℔ lb.; soda ash, $1.90 ℔ 100 lbs. 58%; hyposulphite of soda, 2¾@3c ℔ lb.; blue vitriol, 5¾@6½c ℔ lb.; borax, concentrated, 7@8c ℔ lb.; chlorate of potash, 12@13c; roll sulphur, 6c; alum, $1.90@2.00; flour sulphur, French, 2¼@2½c; California refined, 1¾@2c; nitric acid, in carboys, 8c ℔ lb.; caustic soda, in drums, 3@4c ℔ lb.; Cal. s. soda, bbls., $1.00; sks, 95c ℔ 100 lbs.; chloride of lime, spot, $2.50@2.60; nitrate of potash, in kegs, 8c; caustic potash, 10c in 40-lb. tins.

OILS.—Linseed, pure, boiled, bbl., 75c; cs., 80c; raw, bbl., 73c; cs., 78c. Deodorized Stove Gasoline, bulk, 14½c; do., cs., 20½c; 86° Gasoline, bulk, 20c; do., cs., 26c; 63° Naphtha or Benzine, deodorized, in bulk, per gal., 13½c; do., in cs., 19½c; Lard Oil, Extra Winter Strained, bbl., 75c; cs., 80c; No. 1 bbl., 50c; cs., 55c. Neatsfoot Oil, coopers' bbls., 60c; cs., 65c; No. 1 bbl., 50@52½c; cs., 55@57½c.

COAL. — San Francisco, coast, yard prices: Wellington, $9; Seattle, $7.00; Coos Bay, $5.50; Southfield, $9.00. Cargo lots, Eastern and foreign: Wallsend, $8.00; Brymbo, $7.50; Pennsylvania, bd., $14.00; Scotch, $8; Cumberland, $12; Cannel, $9.50; Welsh Anthracite, $12.00; Rock Springs, $8.50; Colorado Anthracite, $14.50. Coke, $16 per ton in bulk; $18 in sacks.

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Ericsson Telephone Co. 1
Eureka Co. 1
Eureka Con. Mining Co. 2
Evans & Co., C. H. 12
Excelsior Redwood Co. ..... —

F

Fairbanks, Morse & Co. 3
Falkenau, Louis 14
Florence & Cripple Creek Railroad Co. 2
For Sale 1
Fowler, G. C. ..... —
Fraser & Chalmers 17
Frenier & Son 20
Frue Vanning Machine Co. ..... —
Fulda's Planing Mills ..... —

G

Gardner Electric Drill & Machinery Co. 21
Garratt & Co., W. T. 20
Gates Iron Works 11
General Electric Co. 21
Globe Iron Works 15
Gold & Silver Extraction Co. of America, Ltd. 15
Griffin, Frank W. 9
Gutta Percha Rubber & Mfg. Co. ..... —

H

Haas, Baruch & Co 15
Haff, Edward L. 14
Hallidie Ropeway 22
Hamilton, W. H. W. 14
Hampson, C. M. 14
Hanks, Abbot A. 14
Harvey, Alfred 14
Heald's Business College 19
Hendrie & Bolthoff Mfg. & Supply Co. 5
Hendy Machine Works, Joshua 12
Hercules Gas Engine Works 21
Hersey, Clarence 14
Heyl & Patterson 16
Hiertz & Son 21
Hirsching, H. 14
Holt Manufacturing Co. 4
Hoskins & Co., Wm. 15
Hooper Pneumatic Milling Co. 17
Hooper & Co., C. A. ..... —
Hug, D. 13
Hunt, A. M. 14
Huntington, F. A. 21
Huntley, D. B. 14

I

Ingersoll-Sergeant Drill Co. 9

J

Jackson Drill & Mfg. Co. 8
Jackson Machine Works, Byron 9
James, T. 1
Jeffrey Mfg. Co., The 16
Jesmer & Co., R. L. 1
Jessop & Sons, Ltd., Wm. 8
Jewett, Daniel G. 14

K

Kent Mill Co. 18
Keystone Driller Co. 8
Knight & Co. 13
Koppel, Arthur 21
Krogh Mfg. Co. ..... —
Kyle & Co., T. D. ..... —

L

Lallie, J. S. J. 14
Langley & Michaels Co. 1
Larkin Mining Co. 20
Leffel & Co., James 13
Leschen & Sons Rope Co., A. 7
Lexow, Theodor 8
Leyner, J. Geo. 18
Link-Belt Machinery Co. 11
Locomobile Co. 20
Luckhardt Co., C. A. 14
Ludlow-Saylor Wire Co. 9
Lunkenheimer Co. 19

M

Macdonald, Bernard 14
Machinery & Electrical Co. 16
Madison, Bruce & Sellers 18
Main Belting Co. 16
Mandell, Frank C. 14
Marion Steam Shovel Co. 19
Mariposa Commercial & Mining Co. 20
Marshutz & Cantrell 9
McFarlane & Co. 20
Meredith, Wynn 14
Michigan School of Mines 17
Midland Terminal Railway Co. 12
Mine & Smelter Supply Co. 7
"Mining Investor" 17
Modern Machinery & Electrical Co. 9
Montgomery Machinery Co., J. H. 16
Moore & Co., Chas. C. 6
Morris, H. D. & H. W. 10

N

National Cons. Mining Co. 2
National Iron Works 9
Nevada Metallurgical Works 14
New Process Raw Hide Co ..... —
Nicholson, Hudson H. 14

O

Ogden Assay Co. 14
Oriental Gas Engine Co. ..... —
Osceola Con. Mining Co. 20
Otis, McAllister & Co. ..... —
Oxford Beta Tunnel & Mining Co. 20

P

Pacific Coast Smelting & Refining Works 3
Pacific Tank Co. 18
Paraffine Paint Co. 10
Parke & Lacy Co. 8, 22
Paul, Almarin B. 2, 14
Pelton Water Wheel Co. 13
Pellegrin, A. L. & Co. 14
Pennington Sons, Inc., Geo. W. ..... —
Perez, Richard A. 14
Peterson, L. 2
Phillips & Co., Alvin 14
Pneumatic Cyanide Process Co. 15
Port Costa Water Co. 2
Postlethwaite, R. H. 14
Powell Co., Wm. 19
Prescott & Eastern Railroad 20
Price & Son, Thomas 14
Putman & Co., H. J. ..... —

Q

Quick, Jno. W. 12

R

Rand Drill Co. 8
Redington & Co. 1
Richards, J. W. 14
Risdon Iron Works 22
Robins Conveying Belt Co. 16
Roebling's Sons Co., John A. ..... —
Roessler & Hasslacher Chemical Co. 15
Rosenberger, A. F. 1

S

San Francisco Pioneer Screen Works 12
Schaw, Ingram, Batcher & Co. 9
School of Practical Mining 14
Selby Smelting & Lead Co. 8
Shepard & Searing 17
S. H. Supply Co. 2
Simonds, Ernest H. 14
Simonds Saw Co. ..... —
Simonds & Wainwright 14
Situations Wanted 1
Skinner Co., H. E. ..... —
Smidth & Co., F. L. 20
Smith, S. Morgan Co. 13
Smith & Co., Francis 7
Smith & Thompson 14
Smooth-On Mfg. Co. 18
Snodgrass, S. K. 5
Snyder & Co., Frederick T. 1
South Silger Gold Mining Co. 20
Star Drilling Machine Co. ..... —
State Ore Sampling Co. 20
Stevens, Ralph E. 14
Stillwell-Bierce & Smith-Valle Co. 10
Strout & Son, W. H. 14
Sturtevant Mill Co. 18
Sullivan Machinery Co. 8

T

Tatum & Bowen 7
Taylor Iron & Steel Co. 19
Taylor & Co., John 15
Taylor & Co., P. T. ..... —
Thomson & Boyle Co. 16
Trenton Iron Co. 19
Tyler, S. W. 14

U

Union Gas Engine Co. 13
Union Iron Works 4
Union Pacific Railway 2
Union Photo-Engraving Co. 21

V

Van Der Naillen, A. 14
Van Slooten, Wm. 14
Van Wagenen, Theo. F. 14
Vulcan Iron Works 13

W

Wanted 1
Weber Gas & Gasoline Engine Co. 21
Weigele Pipe Works ..... —
Western Chemical Co. 19
Westinghouse Electric & Mfg. Co. 6
Wetherill Separating Co. 20
Wigmore & Sons, John 16
Wimmer, Geo 12
Wohler, Bartning Suc's 15
Wolff & Zwicker Iron Works 15
Wood, Henry E. 14
Woodbury, Geo. E. ..... —
Wynkoop, W. C. 14

Y

Yawger, I. C. 8

Z

Zeller, Geo. A. 1

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Notice is hereby given, that at a meeting of the Board of Directors, held on the 16th day of April, 1901, an assessment (No. 14) of five (5) cents per share was levied upon the capital stock of the corporation, payable immediately in United States gold coin to the secretary, at the office of the company, 773 Mission St., San Francisco, California.

Any stock upon which this assessment shall remain unpaid on the 1st day of June, 1901, will be delinquent, and advertised for sale at public auction; and unless payment is made before, will be sold on TUESDAY, the 25th day of June, 1901, to pay the delinquent assessment, together with the costs of advertising and expenses of sale.

By order of the Board of Directors.

GEO. W. FLEISSNER, Secretary.

Office—773 Mission St., San Francisco, California.

EUREKA CONSOLIDATED DRIFT MINING COMPANY.—Location of principal place of business, San Francisco, California; location of works, Placer County, California.

Notice is hereby given, that at a meeting of the Board of Directors, held on the 25th day of April, 1901, an assessment (No 30) of one (1) cent per share was levied upon the capital stock of the corporation, payable immediately in United States gold coin, to the secretary, at the office of the company, 214 Pine street, room 31, San Francisco, California.

Any stock upon which this assessment shall remain unpaid on the 28th day of May, 1901, will be delinquent and advertised for sale at public auction; and unless payment is made before, will be sold on TUESDAY, the 18th day of June, 1901, to pay the delinquent assessment, together with the costs of advertising and expenses of sale.

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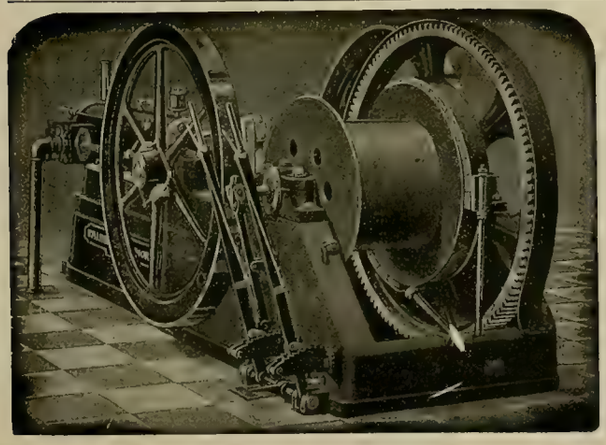

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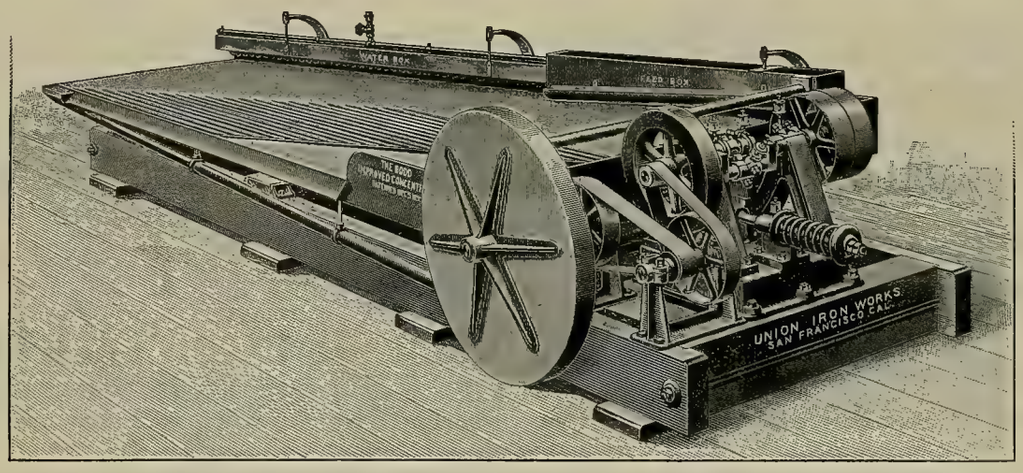

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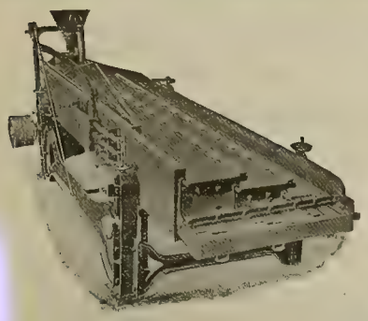

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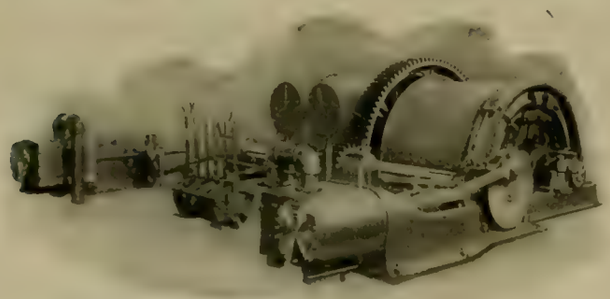

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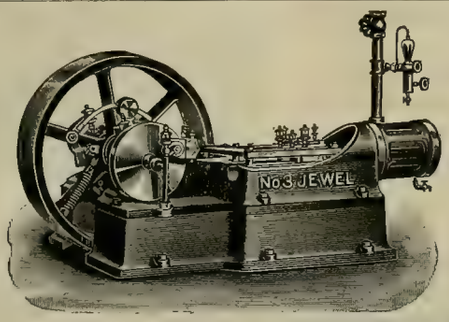

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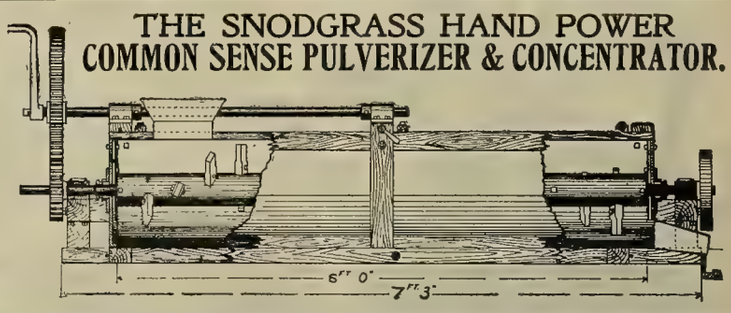

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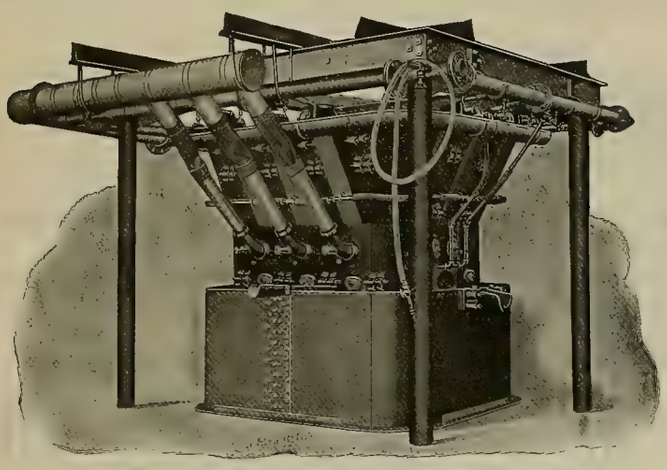

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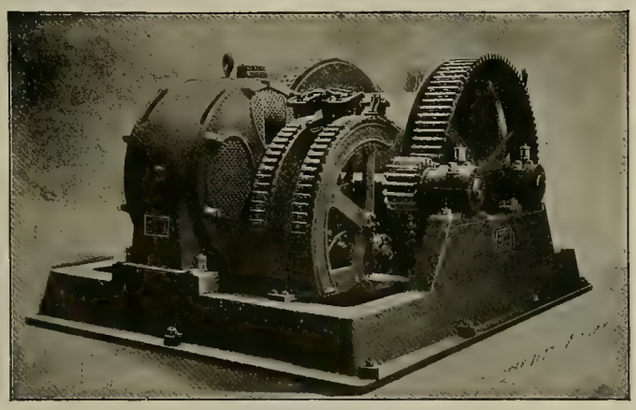

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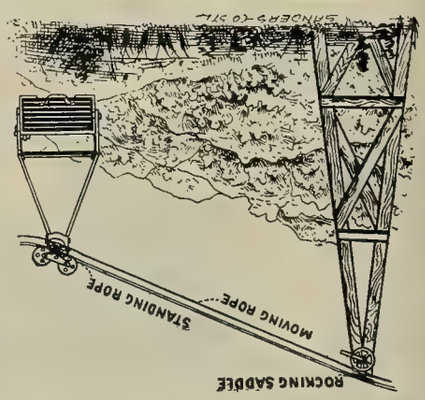

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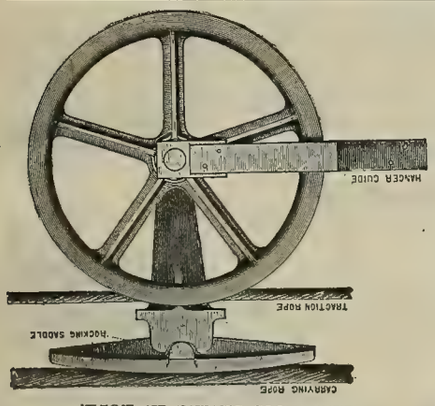

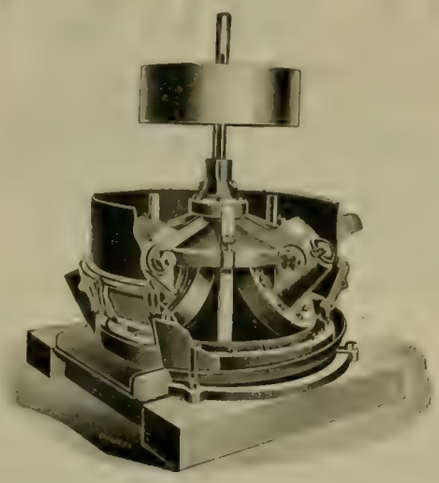

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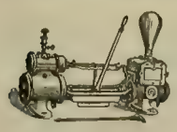

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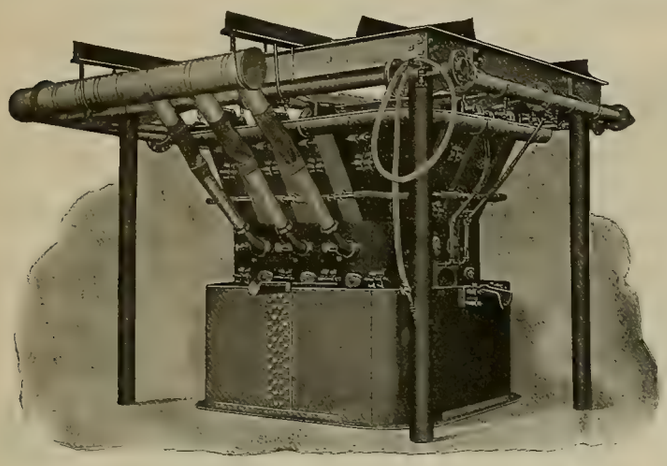

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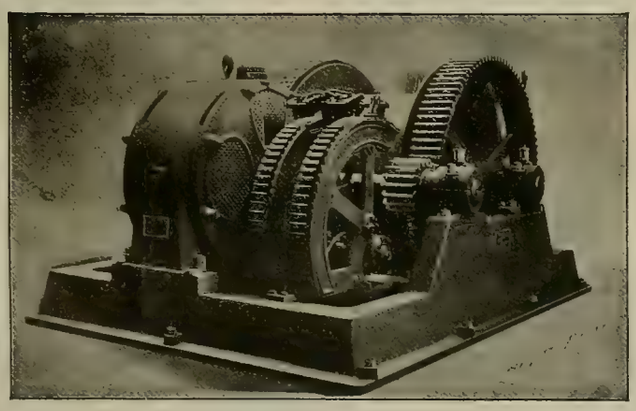

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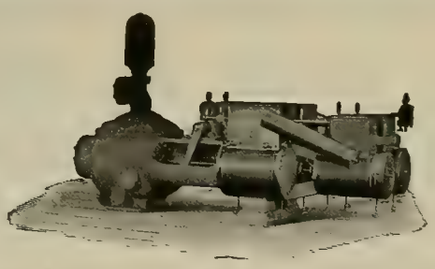

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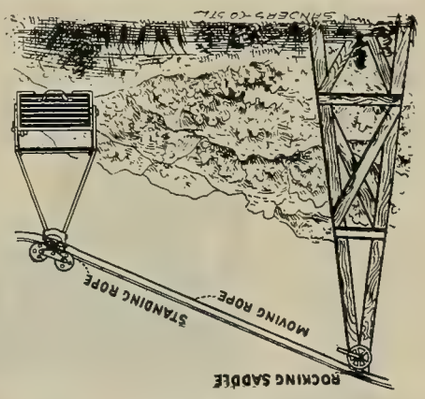

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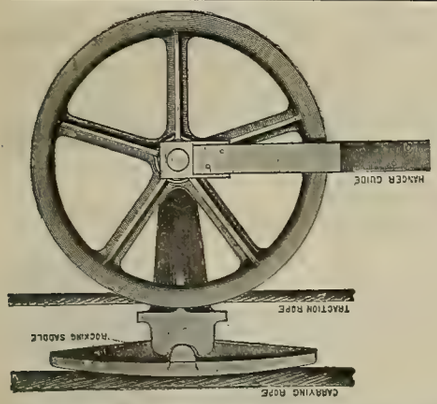

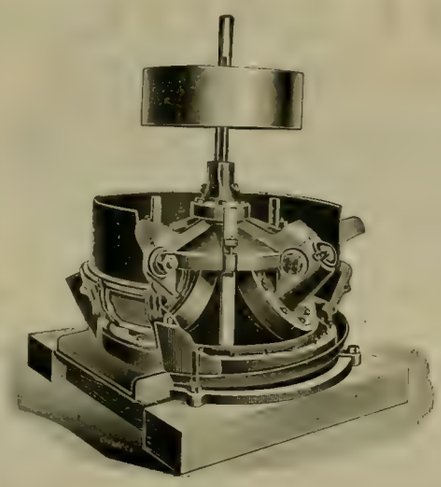

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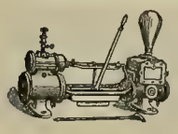

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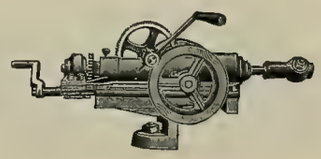

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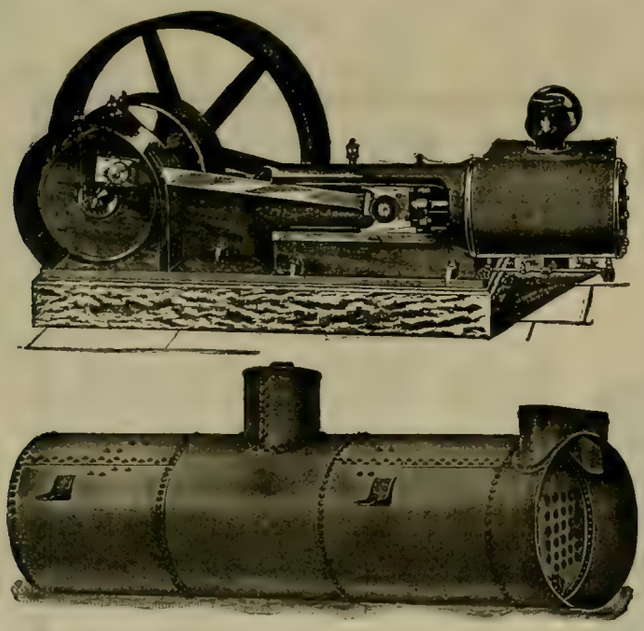

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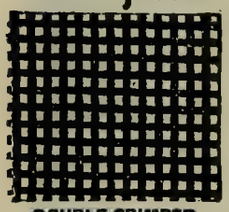

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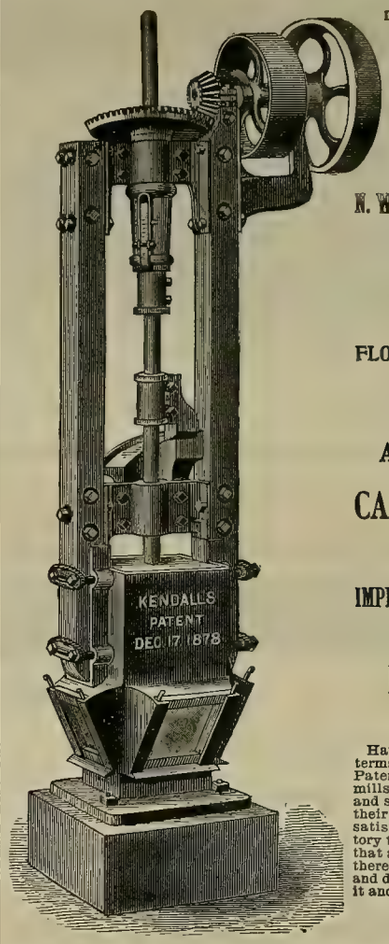

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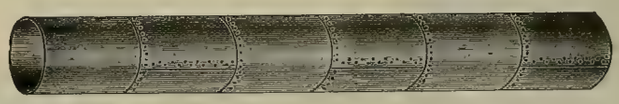

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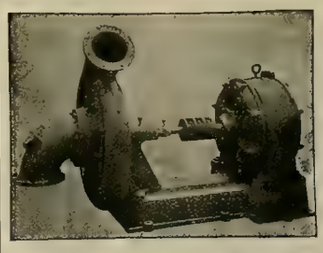

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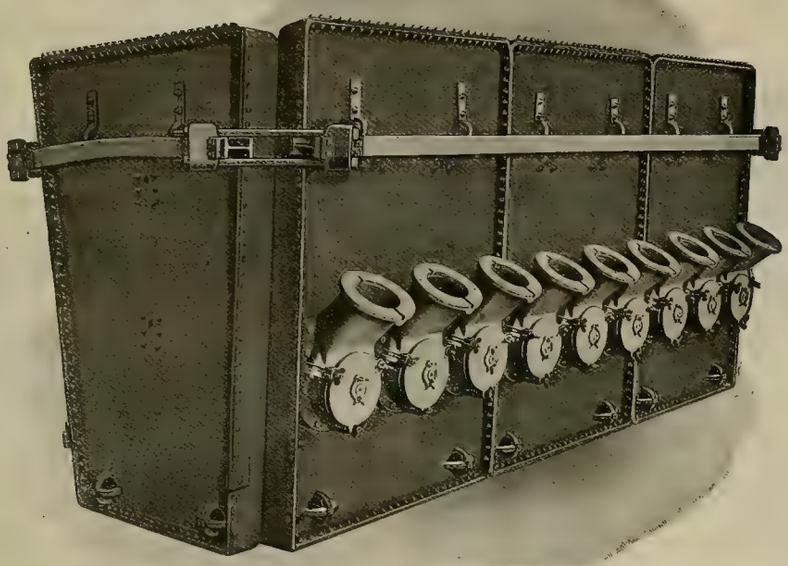

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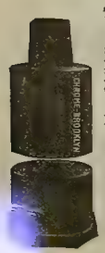

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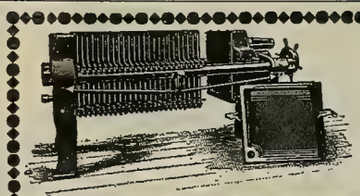

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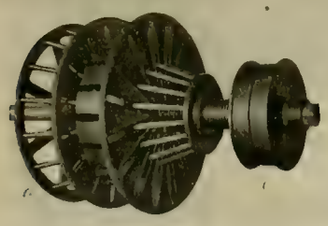

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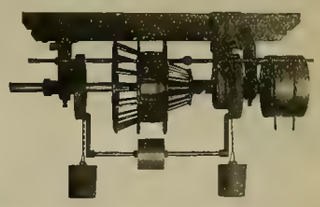

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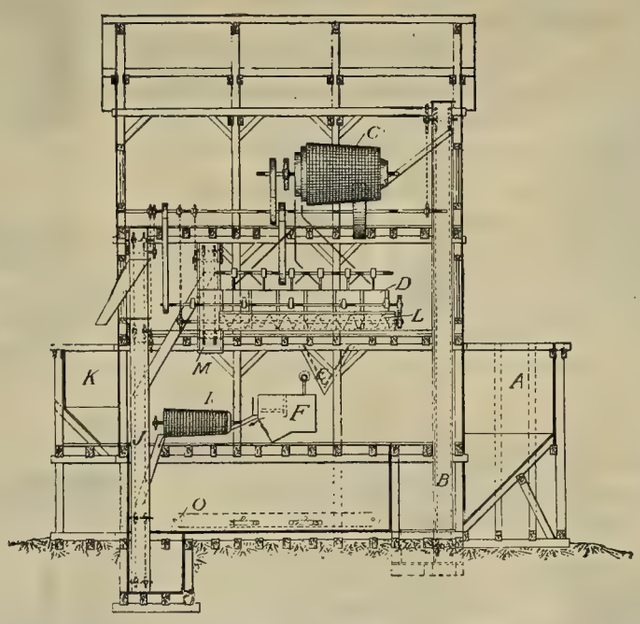

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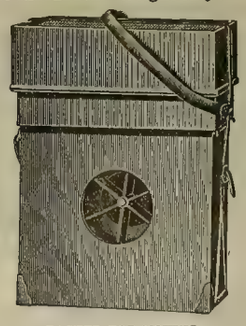

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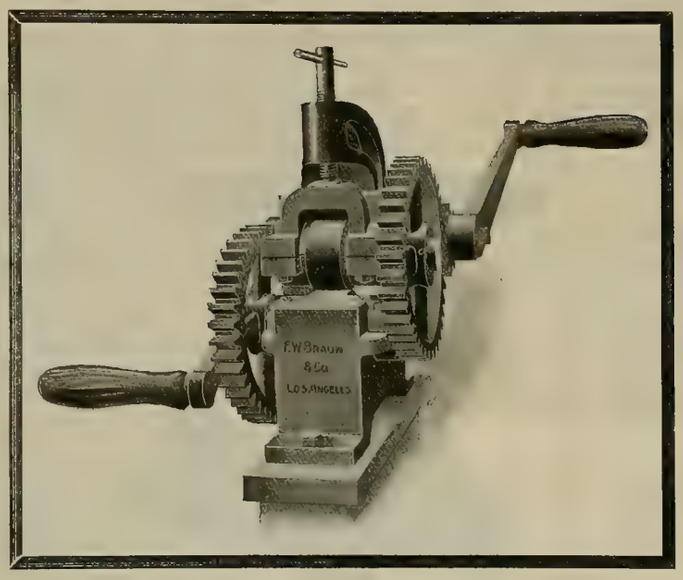

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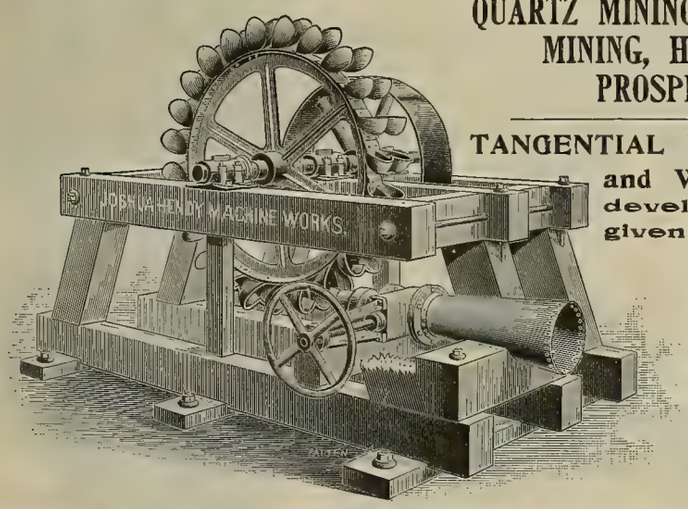

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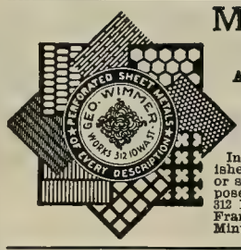

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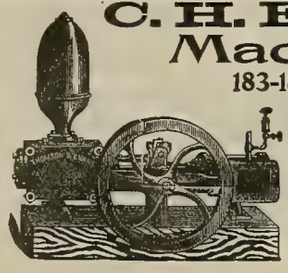

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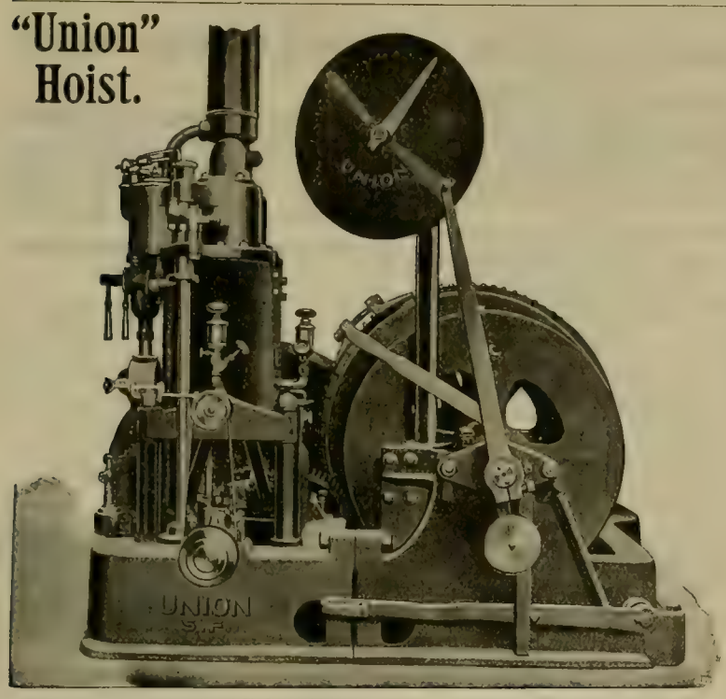

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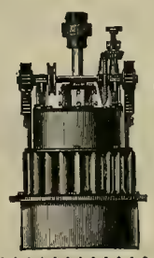

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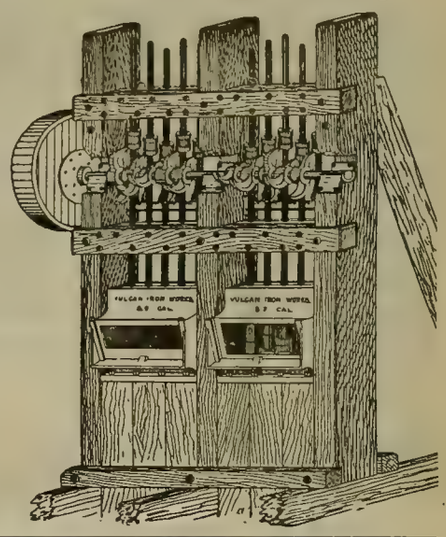

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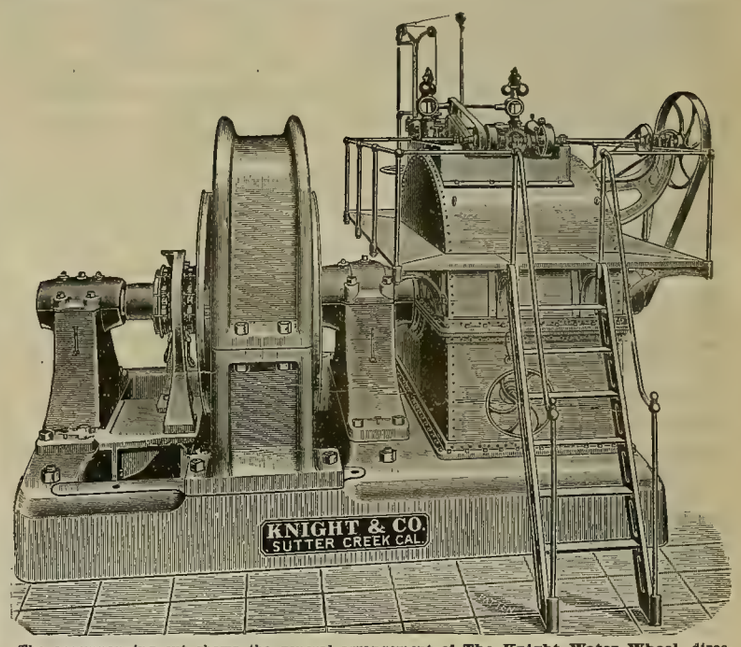

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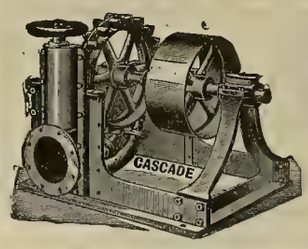

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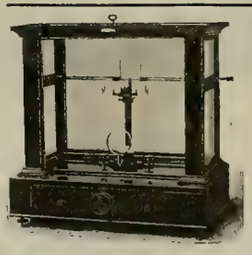

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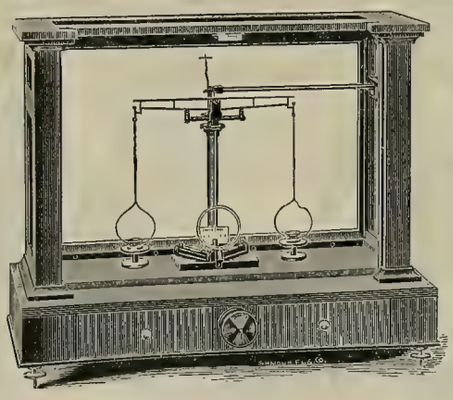

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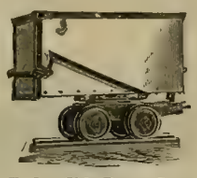

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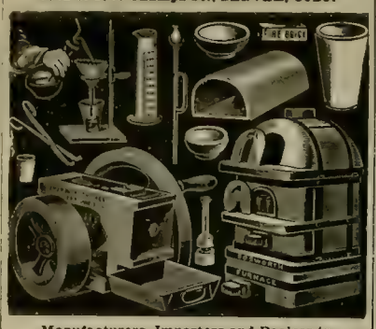

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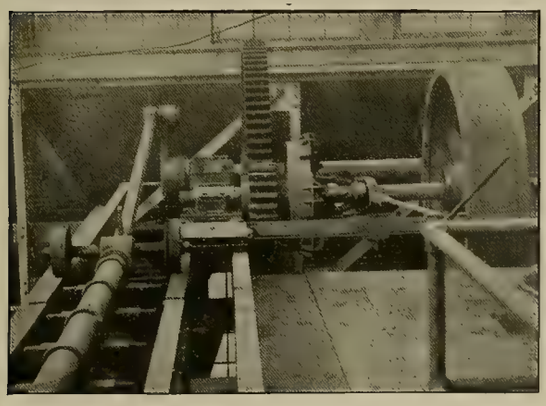

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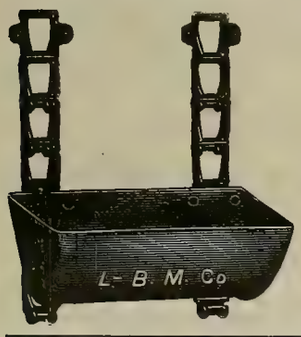

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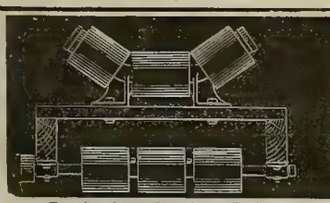

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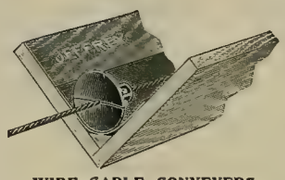

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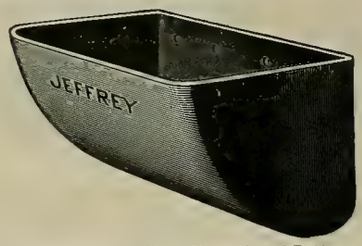

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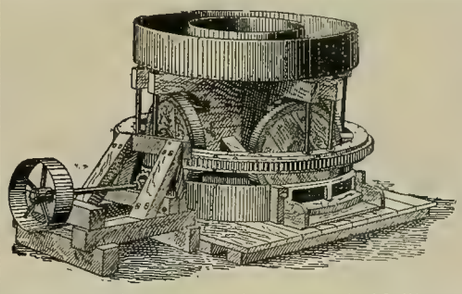

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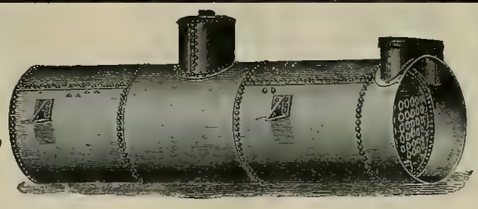

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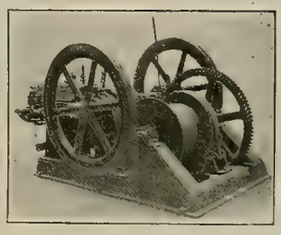

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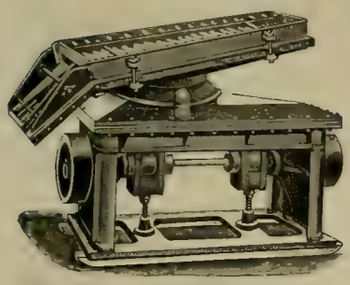

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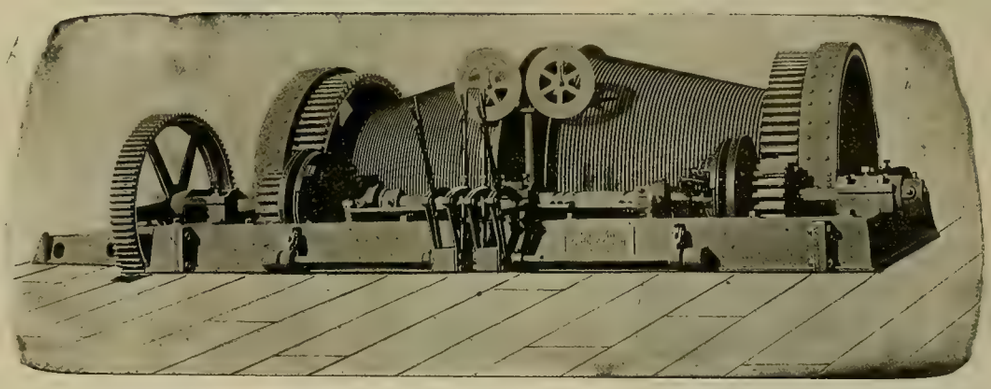

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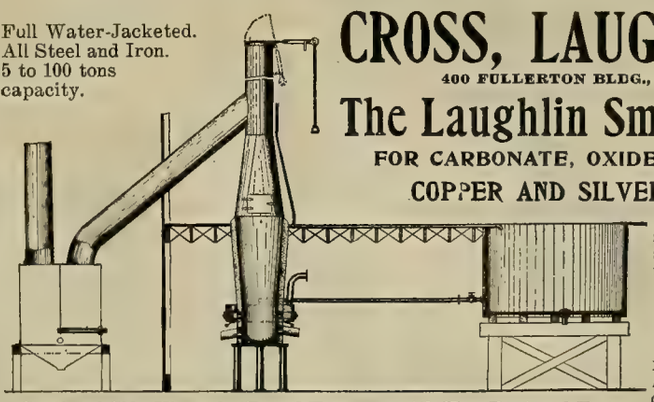

Sectional Side View of a Round Furnace, with Flue Dust and Fume Condenser, and Automatic Water-Jacket Feed and Water-Saving Attachment.

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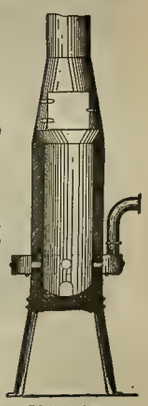

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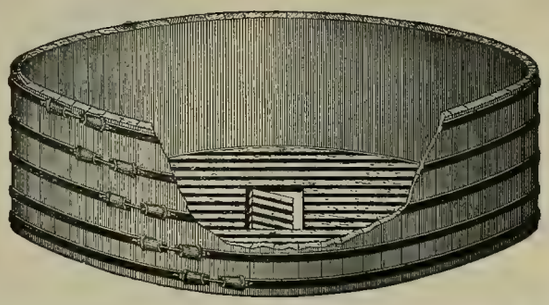

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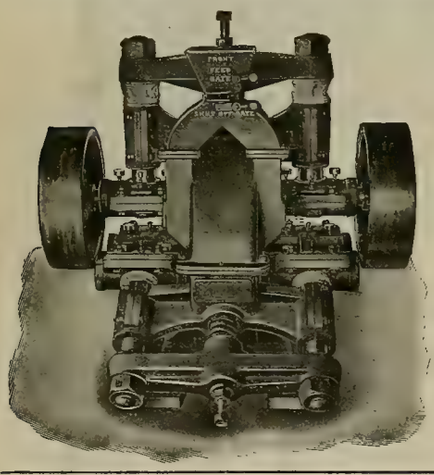

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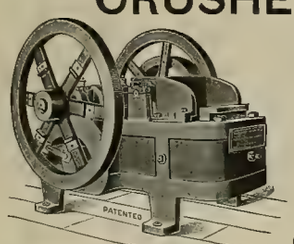

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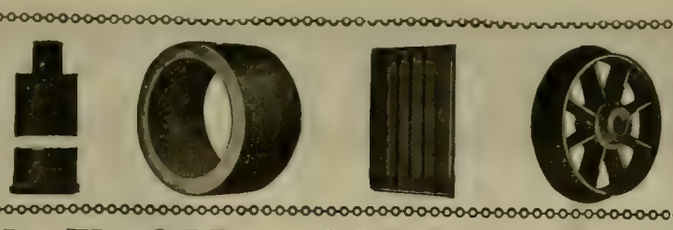

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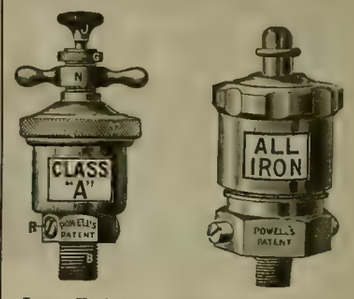

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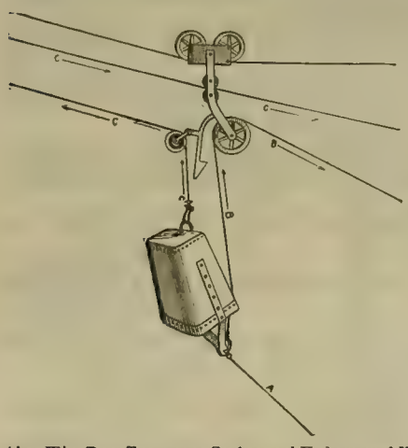

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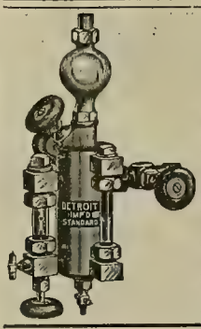

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possess all the improvements and good features that have been suggested by our own and our customers' experience during the past twenty years.

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APPARATUS FOR PYRITIC SMELTING. It saves fuel, increases capacity of furnace, improves character of work, does not require a hot top causing volatilization like other inventions, furnishes pure air heated without cost, can be attached to furnaces already in use, is an all around money saver, built and used by practical, successful metallurgists. Write for particulars to

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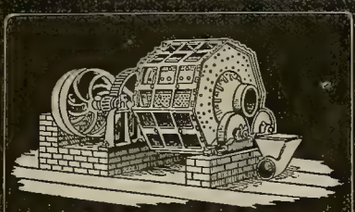

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225

ASSESSMENT NOTICES.

MARIPOSA COMMERCIAL AND MINING COMPANY.—Location of principal place of business, San Francisco, California; location of works, Mariposa County, California.

Notice is hereby given, that at a meeting of the Board of Directors, held on the 18th day of April, 1901, an assessment (No. 22) of Ten ($10) Dollars per share was levied upon the capital stock of the corporation, payable immediately in United States gold coin, to the secretary at the office of the company, Room 223 Crocker Building, San Francisco, California.

Any stock upon which this assessment shall remain unpaid on the 25th day of May, 1901, will be delinquent, and advertised for sale at public auction; and unless payment is made before, will be sold on MONDAY, the 17th day of June, 1901, to pay the delinquent assessment, together with the costs of advertising and expenses of sale.

By order of the Board of Directors.

ALEX. GRANGER, Secretary.

Office—Room 223 Crocker Building, San Francisco, California.

SOUTH SLIGER GOLD MINING COMPANY.—Location of principal place of business, San Francisco California; location of works Spanish Dry Diggings Mining District, El Dorado County, California.

Notice is hereby given, that at a meeting of the Board of Directors, held on the 25th day of March, 1901, an assessment (No. 1) of two cents per share was levied upon all the issued or subscribed for capital stock of the corporation, payable immediately in United States gold coin, to the secretary, at the office of the company, 402 Front street, Room 8, San Francisco, California.

Any stock upon which this assessment shall remain unpaid on the 6th day of May, 1901, will be delinquent, and advertised for sale at public auction; and unless payment is made before, will be sold on MONDAY, the 27th day of May, 1901, to pay the delinquent assessment, together with the costs of advertising and expenses of sale.

By order of the Board of Directors.

J. L. DANIELS, Secretary.

Office—402 Front street, Room 8, San Francisco, California.

AMERICAN OIL AND REFINERY COMPANY.—Location of principal place of business, San Francisco, California. Location of works, Contra Costa County, California.

Notice is hereby given, that at a meeting of the Board of Directors, held on the 26th day of March, 1901 an assessment (No. 3) of five (5) cents per share was levied upon the capital stock of the corporation, payable immediately in United States gold coin, to the secretary at the office of the company, Room 323 Parrott building, 825 Market St., San Francisco, California.

Any stock upon which this assessment shall remain unpaid on the 29th day of April, 1901, will be delinquent, and advertised for sale at public auction; and unless payment is made before will be sold on MONDAY, the 27th day of May, 1901 to pay the delinquent assessment, together with the costs of advertising and expenses of sale.

By order of the Board of Directors.

J. C. ANTHONY, Secretary.

Office—Room 323 Parrott building, 825 to 855 Market St., San Francisco, California.

OSCEOLA CONSOLIDATED MINING COMPANY.—Location of principal place of business, San Francisco, California; location of works, Plymouth, Amador County, California.

Notice is hereby given, that at a meeting of the Board of Directors, held on the 23d day of April, 1901, an assessment (No. 11) of one (1) cent per share was levied upon the capital stock of the corporation, payable immediately in United States gold coin, to the secretary, at the office of the company, 307 Montgomery street, San Francisco, California.

Any stock upon which this assessment shall remain unpaid on the 25th day of May, 1901, will be delinquent, and advertised for sale at public auction; and unless payment is made before will be sold on MONDAY, the 17th day of June, 1901, to pay the delinquent assessment, together with the costs of advertising and expenses of sale.

By order of the Board of Directors.

HOLLAND SMITH, Secretary.

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DELINQUENT SALE NOTICE.

LARKIN MINING COMPANY.—Location of principal place of business, San Francisco, California; location of works, near Placerville, El Dorado County, California.

Notice.—There are delinquent upon the following described stock, on account of assessment (No. 10) levied on the 12th day of March, 1901, the several amounts set opposite the names of the respective shareholders, as follows:

Names	No. Cert.	No. Shares.	Amt.
T. W. Baker	201	230	$5 00
T. W. Baker	202	200	5 00
T. W. Baker	203	250	5 00
T. W. Baker	204	230	5 00
J. E. Kraffts	211	200	5 00
J. E. Kraffts	354	250	5 00

And in accordance with law, and an order from the Board of Directors, made on the 12th day of March, 1901, so many shares of each parcel of such stock as may be necessary, will be sold at public auction at the office of the company, 112 Main street, San Francisco, California, on WEDNESDAY, the 15th day of May, 1901, at the hour of 2 o'clock P. M. of said day, to pay said delinquent assessment thereon, together with costs of advertising and expenses of sale.

N. F. REMINGTON, Secretary.

Office—112 Main street, San Francisco, California.

Special Meeting.

OXFORD BETA TUNNEL AND MINING Company.—There will be a special meeting of the stockholders of the Oxford Beta Tunnel & Mining Company, to be held at the office of the company, No. 135 Geary St., Room 111, San Francisco, at the hour of 4 o'clock P. M. on the 4th day of June, 1901, for the purpose of increasing the capital stock of the company from twenty-nine hundred shares of the value of one hundred dollars each to one hundred thousand shares of the value of two dollars and fifty cents each. By order of the Board of Trustees. W. H. KNIGHT, Secretary.

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For Elevating Tailings, Slimes, Battery Sands to Jigs, Etc.

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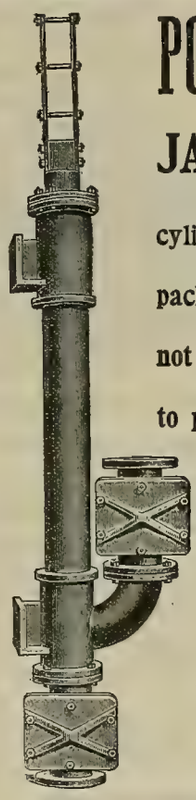

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Pumps sand and grit without injury to cylinder.

Seldom requires packing and is easily repacked.

Forces water on the down stroke so does not require balanced bob.

Water column and pump rod can be made to perfectly balance.

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Combines strength with lightness.

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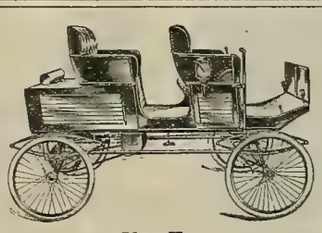

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STATIONS: 1255 Market Street, San Francisco. 103 South Broadway, Los Angeles. 106 Telegraph Avenue, Oakland.

Your choice in nine different styles. Ladies can operate them. Sold in guaranteed condition at reasonable prices. Illustrated catalogues and information will be sent on application.

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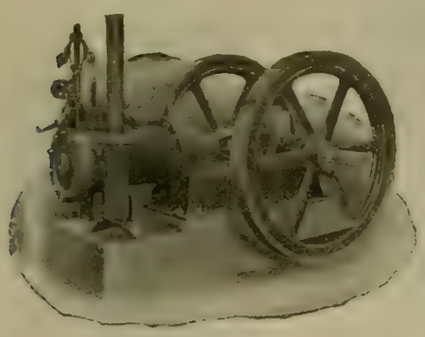

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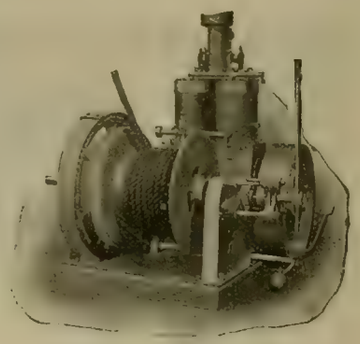

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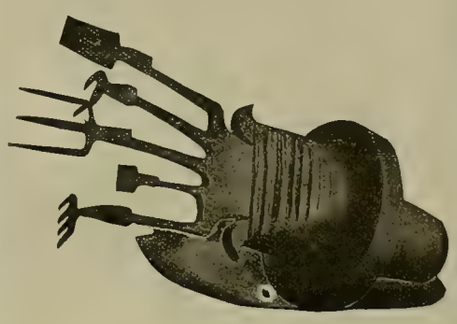

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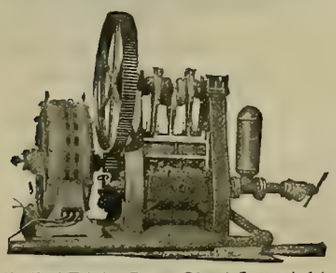

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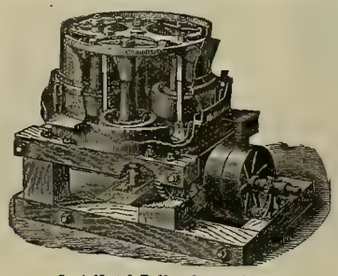

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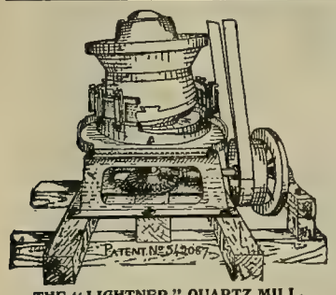

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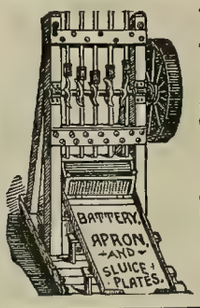

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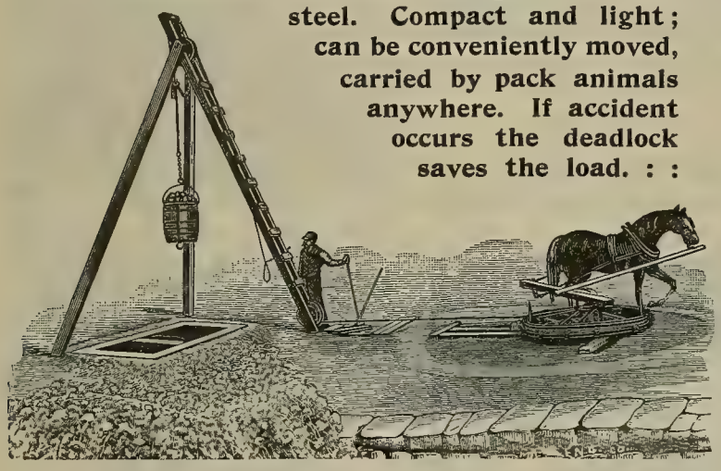

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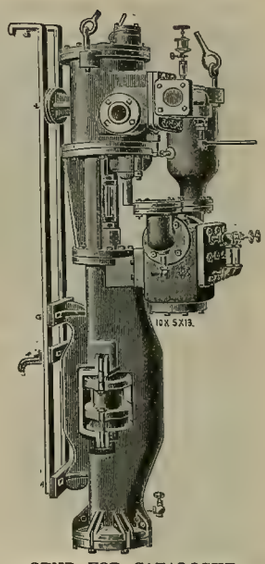

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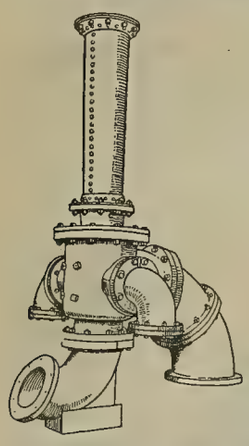

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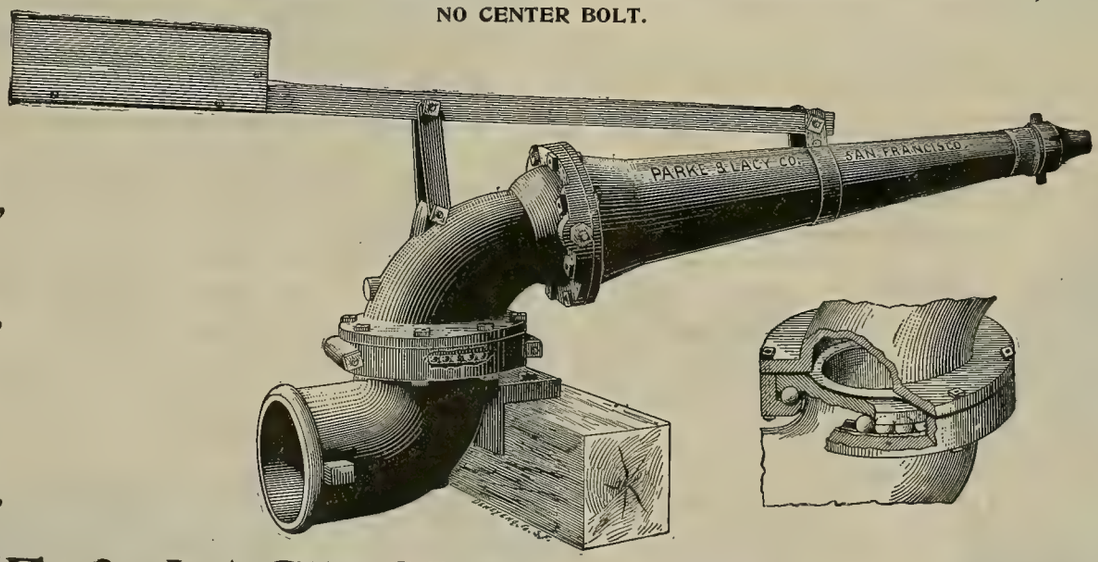

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MINING AND SCIENTIFIC PRESS.

Whole No. 2128.—VOLUME LXXXII. Number 18. SAN FRANCISCO, SATURDAY, MAY 4, 1901. THREE DOLLARS PER ANNUM. Single Copies, Ten Cents.

Mother Lode of California.*

Twenty-one years ago the writer rode over the line of the mother lode from Placerville in El Dorado county to Princeton, in Mariposa county, Cal. It was then an almost unbroken line of abandoned mines and silent stamp mills. It was the low level, the depression point, of the gold quartz mining industry resulting under the old conditions of costly mining and milling, and a belief that the profitable ore bodies were near the surface and had all been worked out.

A scant half dozen mines in that whole line were active and producing. The Keystone at Amador City, a view of which appears on this page, the Haywards mine at Plymouth, the Mahoney at Sutter Creek and the Gwin in Calaveras county were the only live mines then. The Utica, Kennedy, Argonaut, Oneida, Rawhide, Dutch, Jumper, and many others, since then large and profitable producers, were at that time believed to be worked out and dead permanently. It was a matter of common belief then that the mother lode could be bought from end to end for less than a million dollars. No one then would have considered the investment desirable.

Now a similar journey would disclose practically the reverse condition, an almost unbroken line of active producing mines. New ore bodies have been found in the interval, the limits of the old known ones have been extended, costs of exploitation have been reduced, the mines have been found to go down, and as a consequence many great mines have years of active profit-earning life ahead of them.

The revived gold mining industry is industrially clean. It produces yet does not compete. Its production is directly available to the miner, the money metal of the world. It has all markets. No adverse organized commercial interests, by merely changing bits of paper between them, can divide its legitimate profits with the people really entitled to them.

* See page 210.

Keystone Mine, 300-Foot Level, North, on Big Vein. (See page 210.)

Keystone Mine, Amador, Amador Co., Cal.: View Looking South. (See page 210.)

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San Francisco, May 4, 1901.

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Secretary's Decision in Oil Land Cases.

The Secretary of the Interior has dismissed the appeal of the scrippers from the decision of the Commissioner of the General Land Office, sustaining the mineral claimants in the oil land cases. He says in his decision that the right of selection of lieu land for land included in a forest reservation was an offer to exchange on the part of the Government, and that it is incumbent on any one selecting to take advantage of the offer made by the law to establish the fact that the land selected is of the character contemplated by law. Until this fact is established the proffer of exchange is not completed. To lodge in an applicant for exchange of lands under this law vested right as against the ownership of a third party, it must be made to appear that the land sought to be acquired is of the character contemplated by the law. It is essential that the applicant should show that the land selected in exchange is vacant. Portions of public lands may be occupied and for that reason be not subject to selection, and yet there be no mention of their occupancy in the records of the land department. It frequently occurs that persons desiring to secure title to lands under the homestead law settle upon and occupy the same for months and even years before placing their claims on record. The decision also notes the discovery of petroleum made on the land since the contest was initiated as having made the land clearly mineral land, and, therefore, not subject to selection.

The decision is a gratifying victory for the miners. The language of the decision is very broad. Besides practically settling the vexatious litigation which has burdened the oil industry, there is a recognition of principles that have a bearing on the long-drawn-out contest between the miners and the land grant railroads. The definition of lands that could be selected in exchange for forest reserve lands as lands that must be vacant, unoccupied physically or unclaimed, at the time of selection would seem to apply to the seperate tracts of land granted a railroad at the time the grant attached. So applied, much—and, indeed, most—of the mineral lands in dispute would be excluded from the grant and could not thereafter be brought within it.

THE fees allowed by Judge Clancy in the receiverships of the Boston & Montana Co. are a reminder of bonanza days on the Comstock. T. R. Hinds, receiver for five and one-half days, was allowed $200,000 and counsel fees and expenses amounting to $31,116 more.

Miners' Associations.

Some ten years ago, as a result of business conditions that had been gradually growing up during the preceding decade, the miners of California organized in self-protection the California Miners' Association. An organization, based on a measure of real injury to some valley lands as a result of forty years of mining in the mountains, was actively engaged in closing down without recourse a great existing placer mining industry—at the most, only partially responsible for the injury. The railroad was engaged in restricting the area of mineral land open for the exploitation of the miner by appropriating under its land grant lands which Congress had intended to reserve from the grant for the miner. These two strong organizations attacked the miners, who had no organization and no unity of action, and were rapidly annihilating and appropriating their industry. The miners, realizing their individual helplessness, organized to resist the pressure on them. The result of that organization is the practical restoration of hydraulic placer mining, and the preservation in the public domain of vast areas of mineral-bearing land. Directly they accomplished the specific objects of their organization, and indirectly they did greater things. They developed the idea and fixed it in the minds of people who were not miners that mining was a legitimate business, which could repay thrift and intelligence, the investment of money and time, just as did any of the other commercial occupations. Mining as an industry in California to-day is a business of greater magnitude, as a result of the interest developed in it by the organization of the California Miners' Association. It receives more consideration and assistance from all classes of our people as they realize how dependent on it have been all the other producing and commercial industries of the State of California.

This brief resume of conditions and how they were met and overcome is given to draw a parallel between California mining of ten years ago and what it seems the mining of other States and Territories is now. Miners in these States are finding that there is on them a commercial pressure to their disadvantage. Just as in California, there are two interests opposing—the railroad, as in California, and the combined trust of the smelting industry. The alliance between the two adverse interests is closer than it was in California. In the latter State the gold mining was so independent of transportation that the method of attack by discriminating freight charges could do little; but with miners dependent on smelting methods of reduction, the pressure of discriminating transportation can be made annihilating in its force. The smelters have even greater repressive power; for the railroads are semi-public institutions which are common carriers. Smelters are private affairs entirely and have no quasi public control over them.

The condition confronting the miners of these States is made rather more serious than the California condition by the control of the market possessed by the combination of smelters and railroads, or, rather, of the people who own both. They are, as well, the sole sellers of the products, and the great manufacturing trusts they also control are the chief buyers.

The miner in the scheme of things as being contrived is simply a producer of raw material, reduced to a condition of indirect involuntary servitude. Singly he is helpless against such attacks as the iron-clad contract being submitted to him by the American Smelting & Refining Company. He must accept the partnership of people in his profits who carry absolutely none of his risk. The result this paper anticipated on the announcement of the organization of the Smelting Trust is already forced. The miners must combine.

The meeting of all the silver-lead mine owners in the West called from Denver is a result. It is necessary, proper, and timely. It should go further, and be more inclusive. The example and lesson of California experience should be studied and followed. Organization should begin with units of counties, it should build into State organizations, these last should affiliate and become as one. The interest should not be limited to one class of ore production as the silver-lead men. It should include the mine owners of all classes of mines, the owners of independent treatment plants, the local builders of mining plants and machinery, the commercial men of the mining camps and the workers in mines, the men who have brain as well as brawn. All these people should realize the interdependence of their interests in the contest now initiated and should stand together. The power opposed which can enforce the acceptance of such contracts as are proposed by the American Smelting & Refining Co. can decide whether or not a mining town shall exist or be wiped off of the map. Others besides miners are interested in this phase of the question.

California miners did not find it necessary to consolidate their mines to accomplish results. It does not appear necessary now. What is wanted is unity of action and directness of purpose. There should be no scattering among many desirable things that miners' associations could accomplish. There is work enough cut out now. The issues should be limited to it.

The business of mining was based on the principle that the rewards of it belong to those who seek and secure them in the bowels of the earth, risking fortune and life in the attempt, and not to those who on the surface of the earth, risking neither life or fortune, beneficiate what has already been brought into being. The profits of mining belong to the miner, not to the millman or smelter or railroad carrier. Let the effort of association be directed to make this principle, which WAS, when men from choice became miners, be the principle which IS, now that miners have only to hold what their effort has gained. Establish this business principle with all the force of law. Make it operative commercially. Establish further the principle that the small mine owner has an equal right to the profit of the ore he produces with the large mine owner. That he is entitled to the same payments and to no greater costs per unit. It must be conceded that he has far more than an equal necessity for this equality of commercial right.

The condition does not admit of compromises. The miners are logically and commercially right in demanding the profits of mining. The industrial condition which would give to the smelters and transportation these profits is an absurdity. It cannot exist if the miners' associations properly direct their efforts and persist in their direction till they have accomplished.

THE State of Nevada shows signs of a revival of something like the old time activity in mining. Tonopah, from all accounts a live, growing mining camp, is building up on a discovery of value in lodes the croppings of which are said to stand out so boldly as to be visible miles away. That the discovery should not have been made years since is surprising. Reno is starting into mining activity over a close-by discovery of rich silver ore. Float chloride of silver was first found, and then traced to its lode source. The latter—hardly scratched yet—is said to be showing considerable extent and excellent values. The location is not distant from the Comstock lode and the developments made so far make this discovery well worth watching.

THE Colfax Folio of the U. S. Geologic Atlas practically completes the publication covering the gold-bearing region of the Sierra Nevada mountains in California. The work as a whole shows progressive improvement with the successive folios issued and is invaluable to California miners, and of unique technical interest to geologists generally. There is probably no similar area anywhere in the world. The yield of either placer or lode gold has not been attained areally in any other locality. There is no lode system on so grand a scale. The phenomena of buried rivers and of the structural geology they make are nowhere more intelligible, nowhere are they more commercially fascinating.

THE foreign agitation of a commercial alliance against the United States for the purpose of restricting our export trade could hardly result in affecting the exports of the products of our mines. These latter are indispensable in increasing quantities to foreign industry, and the foreign countries requiring them do not seem able to increase the production of their own mines.

Concentrates.

THE metal from Bishop Creek, Inyo county, Cal., is tin.

SUBMERGED gravel beds can be tested for gold by drills.

A TASMANIAN tin mine has paid 287 dividends aggregating $9,000,000, being $705 on each share.

EMERY WHEELS should be given a rim speed of 5500 feet per minute to work at their best efficiency.

THE total gold production of Cripple Creek to date is $100,000,000. Of this, $20,000,000 has been paid in dividends.

THERE is an increasing demand for mica for use in the arts. It is employed ground very fine in the manufacture of fine grades of wall paper.

INFORMATION relating to mining of borax deposits is to be found in the third, eighth, tenth and eleventh reports of the State Mineralogist of California.

ACID WATERS are prejudicial to amalgamation. The quicksilver is attacked and sickened. Quicklime added to the water will remedy the acidity of the water.

THE most intense heat known is that of the electric arc. Next to that is the heat produced by the combustion of aluminum. It is known to be in excess of 5000° Fahr.

GOLD in black sand is ordinarily a mechanical admixture. Drying the sand and removing the magnetite by magnetic parting devices leaves the gold in much easier recoverable condition.

CINNABAR occurs occasionally in crystalline incrustations, color red, streak scarlet. Its composition is: Mercury, 86.2%; sulphur, 13.8%. It has been found in the Cascade mountains, in Oregon.

MAGNESITE, carbonate of magnesium, is used in the manufacture of paper. The preparation consists of roasting and grinding to a powder. There is a roasting furnace in operation at Porterville, Cal.

AT the Harrison Gulch mine, in Shasta county, from ore assaying $30 a ton, there is recovered $20 by amalgamation and $9 by cyanide treatment of the tailings. The total recovery is thus about 96.66%.

CALIFORNIA has the distinction of having the longest electrical power transmission in the world. The Standard Electrical Co. transmission line from the Mokelumne river in Amador county to San Jose is 184 miles long. The voltage used is 60,000.

IN locating a claim, the natural objects or permanent monuments required by the mining statutes to be referred to are not required to be on the ground located, though they may be, and the natural object may consist of, any fixed natural object.

MAGNALIUM is the name of a new alloy of aluminum and magnesium, containing from 2% to 30% of the latter. This new metal is said to retain the better qualities of aluminum. It can be worked with a file, turned or planed, and is a good solder.

POWER SCHEMES including whole counties have been projected in England. The proposition was to convert coal into electrical power at the coal mines and to distribute it by wire to all users of power, doing away with independent plants altogether.

OPALIZED WOOD has no regular market value. The Arizona variety is sometimes cut into slabs for ornamental purposes. A start was made at using it for an abrasive, but the discovery and manufacture of carborundum made it unprofitable.

OIL WELLS have great drainage power. They have been known to draw from distances up to half a mile. It is not necessary to sink wells close together to get all the oil. The sinking of a well on each acre of an oil-bearing tract is wasteful and unnecessary.

THE right to a mining claim location, once sufficiently marked out upon the ground and the other necessary acts of location performed, cannot lapse or become forfeit by the obliteration of the marks or removal of the stakes without the fault of the locator.

THE total population of Alaska, including the natives, is 63,592, according to the census of 1900. Nome City had a population of 12,486, Skagway 3117, Juneau City 1864, Sitka 1306. Porcupine, Seward City and Klukwan are omitted from the return of population.

THE aim of the millman operating a stamp mill should be to eliminate what are termed avoidable losses of time. There should be no keys working loose, no belts or tappets slipping, no stamp heads coming off. All of these causes make time losses that are avoidable.

FOR dry crushing rolls, ball mills and stamps have definite ranges of efficiency which determine the choice of type for any particular kind of work desired. The rolls give a better result in granulation, ball mills in absolute pulverization. Stamps are not as satisfactory as either of the others.

NEVADA STATE has offered a bounty of $1000 to the producer of the first five barrels of petroleum from a well in that State, and to the producer of the first thousand feet of natural gas. The person who has the first 6-inch artesian well 1000 feet deep flowing not less than sixty gallons of water a minute shall receive $2500 bounty.

FOR a very long pipe line, designed to carry a large volume of water, the economic head is usually very low. That is, it is less costly to increase the diameter of the pipe and decrease the velocity of flow, so as to make the delivery with the lowest practicable head. The economy comes in in decreased cost, due to a decreased quantity of metal required in the pipe.

SOME gold in ores exists in such a fine state of division that it will float almost indefinitely in water. Occasionally an ore is found in which the quantity in such fine state of division is so large that its loss makes wet crushing and amalgamation wasteful. The proper method of treatment, other than smelting which would surely save it, would seem to be by crushing dry and cyaniding.

IRIDIUM and osmium combined in the mineral iridosmine occur in small, flat scales in gold-bearing gravels of northern California. A lately discovered locality is in one of the headwaters of Cottonwood creek, in Shasta county. There is quite a demand for osmium in connection with the mantles for incandescent gas lamps. The commercial price of the refined metals is about the same as platinum.

THE discoverer of a lode may locate portions of his lines on a previously located claim so as to get all the extralateral rights that are not appropriated by the extralateral rights of the previously located claim, and in mining may follow his lode within the lines of the previously located claim so long as the workings are not on portions of the lode held under the extralateral rights of the prior location.

THERE is considerable variation in the quantity of water required in stamp mill practice. In California mills the range has been from 227 cubic feet to 513 cubic feet to the ton of ore stamped. While the character of the ore and the fineness of the crushing determine to some extent the amount used, the construction of the mortar and the height of the discharge are the principal factors in causing the wide range of variation.

THE formula for indicated horse power of a steam engine is $I\,H\,P = \frac{2\,P\,L\,A\,N}{33000}$, where P = mean effective pressure of the steam on the piston head per square inch, A = area in square inches of the piston head, less one-half the area of cross section of the piston rod, L = length of stroke in feet, and N = number of revolutions per minute.

STEAM COAL for naval use at Manila is restricted to a choice between inferior Japanese coal, costing $4 a ton, or Australian of good quality, costing $12 a ton. There are coal beds of excellent quality for naval use close to Vladivostok, in Siberia. The conservatism of the Russian Government has prevented development, though their accessibility is such that the production would take the market to the exclusion of the Japanese coal, on the score of quality, and of the Australian, on cost.

A METHOD of gold mining employed in a few instances in California, and notably in Georgia, combines hydraulicking and wet crushing by stamp mill. The soft gold-bearing rock and its surface soil and sand covering are hydraulicked through sluices and the coarse rock that does not pass the grizzlies is delivered by the sluice at the mill, where it is stamped. The total cost for all the material handled has been brought as low as 8 cents per ton. The stamping is necessary, as the gold is largely in the coarse rock that the hydraulicking does not break up.

A NOVEL application of compressed air lately suggested is in timber felling. The practical difficulty would be to supply the compressed air. Substituting for compressed air an electric motor, the technical difficulty disappears and comparative cost to hand labor is the only point to be considered. The motor could be attached to the auger, the tool used. Sawmills are now provided with electrical plants, and the wires transmitting are readily placed and movable. Two men with electric power augers can do the work of a dozen men with saws, both in felling and cutting into lengths.

A GOOD MIXTURE for the molds when casting steel is made by using linseed oil in place of molasses and sour beer in to hold the sand together. Owing to the higher temperature of fusing of steel over iron, the sand itself becomes fused and glazes, and roughens the castings. The linseed oil seems to soften the sand of the cores. The reason for it is that the oil is fired by the hot metal in being poured. The gases released produce a film between the casting and the core sand, keeping them separated, and vent holes should be provided. Other oils have not been used successfully. They burn out in the drying of the core, whereas the linseed oil thickens and forms a gum, to which the sand adheres.

POTASSIUM CHLORIDE, the mineral carnallite, is practically the commercial source of the potassium chemicals. In the locality of its occurrence at Stassfurt, Germany, it is found in beds alternating with thinner beds of salt and kieserite, a hydrated sulphate of magnesium. Carnallite is a brittle, transparent to translucent mineral, milky white and often reddish in color, strongly phosphorescent. It is readily soluble and has a bitter taste. Its composition is potassium, 14.1%; magnesium, 8.7%; chlorine, 38.3%; water, 39%. As found in nature it can be separated in a fairly pure condition by solution and crystallization by similar means to those employed in the preparation of commercial borax. It has little direct use but is the raw material for most of the potassium chemicals. Its probable value at chemical works is from 1 to 2 cents a pound, but if a large deposit were found in the United States it is valuable and important enough to be worth consideration as the basis of a chemical works itself. The potassium chloride, the mineral sylvite, corresponds to the sodium chloride, common salt. It is, so far as yet known, a mineral too uncommon to be used commercially to any extent. It is found at Stassfurt. Containing 52.4% of potassium it would be worth as raw material about four times as much as the carnallite. Carbonate of potassium is so deliquescent, absorbent of water, that it is of doubtful occurrence in natural deposits. It would be, if found, as valuable as the chloride as raw material for the commercial potassium chemicals. There is no reason why these salts should not exist in some of the dry lake beds of Nevada and southeastern California and be as commercially utilizable as the borax deposits.

CONTACT LODES—that is, veins formed at the line of joining of two dissimilar rock formations—frequently offer opportunities for the employment of diamond or core drills in prospecting. This is particularly the case if one of the formations is notably softer than the other. Lodes formed on contacts are frequently accompanied by more or less regular bodies of ore in the softer rock, with which they are connected by seams and stringers, or by a lesser mineralization of the intervening rock. All the stringers do not lead into ore bodies of commercial value, and it is not always economical to follow them by the ordinary mine openings. The core type of drill can be utilized to considerable advantage in crosscutting the probable ore-bearing zone. The cores assayed permit the construction of a map which will be a guide not only for the direction of further use of the drill, but for directing the exploitation of a proved deposit.

SOME of the quicksilver-bearing deposits and oil-bearing sands lie close together in California. The metalliferous lodes are younger than the sandstone formations which hold the oil, as they are in part formed in them. The source of the metal is in the underlying metamorphic eruptives but the fissuring from below has in some instances broken across the overlying unaltered sedimentary beds. In mining in these lodes petroleum developed gases are sometimes encountered, indicating the breaking through of the oil-bearing formation by the lode fissure. The indications of near-by petroleum are so conclusive that a quicksilver mining company is proposing to drill for it on the surface of its lode claim. Petroleum is to some extent a metamorphic mineral. It is in its existent form as the result of a considerable degree of heat applied. The heat was not, however, sufficient to metamorphose the rock. Cinnabar and quicksilver volatilize at comparatively low heats. There is a strong possibility that the same heat which made the petroleum was also the moving force in the quicksilver lode formation, and that both were formed at or about the same period of time.

TECHNICAL ADVANCE in the application of mineral substances in the arts is so rapid, and is so wide industrially, that the prospector is safe in having every mineral new to his experience that he discovers determined before passing it by. Uses for minerals that a few years since were mere laboratory curiosities are becoming numerous and are demanding enormous quantities. Others that are common as a result of chemical and metallurgical discoveries become valuable where they were before unavailable. Notably is this so with iron. The reduction in the cost of making it from its ores has made transportation the great single item of the cost to the consumer of the finished product. The inevitable tendency, in order to reduce transportation costs, must then be to make the production as near as commercially practicable to the consumer. Cadmium seems to be another metal, hitherto of no commercial value because of restricted use, that now, as a result of special availibility for electrical storage batteries, will be in considerable demand. Another conclusion that suggests itself is that it can hardly be said that any mining district is yet fully prospected and known. Such are worth going over again for the minerals that preceding prospectors were not looking for.

THE right of location of a mining claim can be exercised by the discoverer of valuable mineral on vacant public land—that is, public land that is not occupied by another valid mining location or on public land occupied by an agricultural claimant who has not proved up his claim. The discovery must be on this vacant public land. The discoverer of valuable mineral on land already validly claimed or occupied cannot by location hold anything at all. Mining location cannot hold the discovery and if it is not good as to the discovery it cannot hold ground on which there was no discovery, even though it is included in the location. The best way to do under such circumstances is for the discoverer to trace his discovery to a point outside of the validly appropriated land and, making a new discovery outside, to start his location from that. The lines of this location made from this last discovery may extend within the previously appropriated ground in order to secure the extralateral rights to the deposit discovered outside. It would seem that it were vital to the validity of a location to make the discovery on vacant public land. The ownership of the appropriated land on which a discovery was made is not material. The fact that the discoverer owns it by mesne conveyance or otherwise does not make a location made on it valid in locating ground outside of it. Ground inside of its boundaries does not require location to hold the mineral discoveries.

The Keystone Con. G. M. Co.*

The Keystone Con. mines are situate at Amador, in Amador county, Cal., and are among the oldest properties on the mother lode. They were discovered and first worked in 1850, yielding well from the old surface workings. The Keystone Con. M. Co. was organized in 1866 and in 1869 bought the adjoining Spring Hill mine. M. J. McDonald of San Francisco is president and principal stockholder in the corporation; W. A. Pritchard is the superintendent.

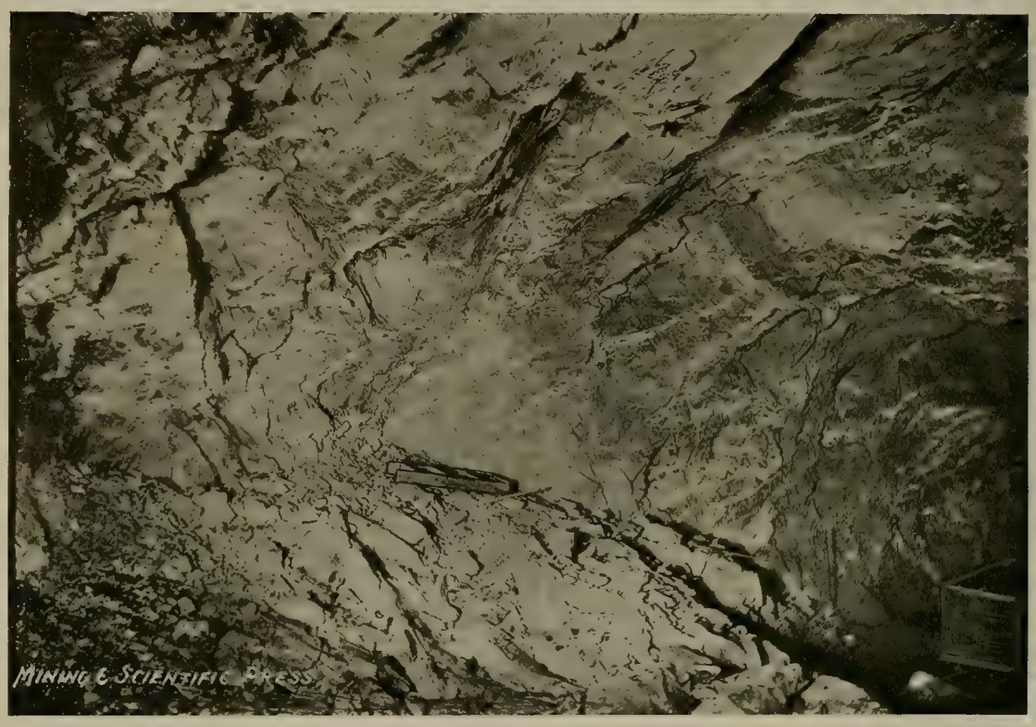
This paper in March, 1866 [Vol. XII, page 13], published the first printed account of the mines as part of its staff correspondence. The writer seems at that early day to have comprehended the geology of the mother lode, his description being singularly accurate to the facts as the subsequent mining has demonstrated them. He describes the great "mother vein of the State" as consisting of a principal ledge, "flanked by a series of subordinate, parallel ledges, running through the country in a northwesterly and southeasterly direction, and keeping the line of contact between the ordinary slate formation of the country on the western or foothill side, and a narrow belt of greenstone, which forms the eastern or hanging wall. The subordinate veins are wholly in the slate, or greenstone, as they happen to lie to the eastward or westward of the principal lead. The main Carson ledge [the old name of the mother lode] varies in width from 3 to 30 feet, and dips (to the eastward in all cases) from 35° to 50° from the vertical. The principal feature of this vein is the large size and steady character of the chimneys of paying ore, which, however, is generally of a low grade, from $6 to $8 per ton being considered a fair yield. The large size of the vein and uniform character of the quartz make its extraction and working very easy and economical. The subordinate veins vary more in the character and richness of their ores, and are generally smaller, although in one case—that of the Keystone claim at Amador City—the ledge, lying westward of the principal vein, is 20 feet in thickness." This general description of the mother lode, stated thirty-five years ago, cannot be improved on to-day.

Locally at the different mines on the hundred miles of the mother lode that have been more or less exploited there are variations of detail from this general description. The Keystone in detail has three veins—the main mother lode vein, the west vein and a third vein between, which has been called the middle vein. All of these at the surface outcrop between two bodies or walls of greenstone, which on the Keystone are close together, but which separate both to the northward and southward. The richest deposits of ore in the mine are where these greenstone walls are closest together, and a like condition of these walls in other noted mines on the mother lode seems invariably to be accompanied by a similar local enrichment of the vein. Raymond, in his Reports of Mineral Resources West of the Rocky Mountains in 1876, says: "The vein system of the mother lode varies in width, sometimes expanding to half a mile and again presenting the features of a true fissure. Where these expansions occur the veins are always broken and of low grade."

The underground developments on the Keystone mine show a correspondence with the surface trend of the greenstone walls. The levels on the main mother lode vein and the middle vein conform to the alignment of the east wall of greenstone, taking a curve with the hollow facing northeasterly. The levels on the west (Keystone) vein seem to trend with the west wall and curve in the opposite direction. Going downward on the vein the east greenstone wall is persistent in dip northeasterly; but the west wall, after following the dip of the east wall to the 800-foot level, straightens up and appears to reverse its dip, so that the lode formed between the greenstone walls appears to open out downward as well as laterally. The cross-section plat shows the characteristic relation of the three veins and of the greenstone walls.

Down till 1866 the greatest depth of the workings on the mine was 584 feet, and by far the greater extent of the workings was above 200 feet. The gross yield of the mine, the Keystone proper, up till that time is claimed to have been $2,225,000.

The great extent of this old working and the subsequent working has been on the west or Keystone vein. Some has been done on the middle vein and less on the foot wall of the main vein in the old Spring Hill claim. The west vein was the principal source of the gold yield, however. The aggregate of it, including the yield prior to 1866, is $11,575,451; and since 1866, $3,765,900 was paid in dividends. The aggregate of its gross gold yield classes the Keystone as one of the great gold mines of the world. In its period of years of continuous operation and production it is probably the leading mine of the State of California.



Keystone Mine—Grey Ore in Face, 800-Foot Level South.

The interesting feature of the property is the comparatively recent developments of ore in enormous quantities and of great profit-earning possibilities, the existence of which during all the years of operation of the mine had been overlooked. The west vein, mined so profitably, consists of a characteristic ore. It is full of little jet black seams (joint planes), along which the gold is principally found. It contains pebbles or kernels of quartz, which, broken, are found to contain a nucleus of gold. It is usually ribboned quartz, with black, slaty seams, is soft and easily broken under the stamps. The ore of the main mother lode vein is distinctly dissimilar in appearance, texture and mineral contents. The rock is exceedingly tough and hard as compared with the black ore, and contains twice as much sulphurets. It consists of masses of quartz in irregular bunches, irregular reticulated veins branching and feathering in every direction, all set in a great mass of more or ess altered eruptive rocks, sheared, splintered, made schistose and slaty and sheeted by compression—the debris of an enormous fault fissure more or less replaced by deposits from infiltration of mineral-bearing waters. It is highly siliceous, though containing in veinlets some calcite. Gold and pyrite are found in the entire mass, except the larger and harder ribs or masses, which closely resemble the greenstone walls. The pyrites is more in the eruptives than in the quartz. The gold can be seen in the quartz occasionally. Next to the east greenstone wall there has been considerable enrichment, and in the Spring Hill mine and in crosscuts from the shafts of the Keystone proper this hanging wall seam has been followed and has yielded considerable rich ore, notably some extremely rich pockets.

In making the crosscuts to reach this extremely rich vein—or, more exactly defined, "seam of a vein"—the great mass of ore of the character described above was cut across and referred to by the miners as a mixture of greenstone and slate. The possibility that it was ore, that it carried gold in payable commercial quantities, that the rich hanging wall pocket seam and a rich foot wall seam, also mined to a minor extent, were integral parts of it were all overlooked for nearly a half century's mining. It is the discovery made inductively, not by accident, that this great mass of rock that has been passed by is really ore, "grey ore," as it is named by its discoverer, from its characteristic appearance in mass as shown in the half-tone view of the face of a 55-foot wide stope on the 800-foot level south—it is this discovery which has given to the old mine a new lease of life as long if not longer than it has had already, and possibilities of profit earning far exceeding its already excellent record.

The credit of the discovery belongs to Mr. Edward Lynch, not a miner either by profession or occupa-

Keystone Mine—Face of Stope, 500-Foot Level South.

See illustrations front page.

tion. Perhaps to that, unconsciously, is due his accomplishment. An exaggeration of the minor details of local ore occurrence, so common to the miner who knows one mine only, did not confuse his inductive reasoning and the development of broad generalizations from maps and comparisons with other mother lode mines.

The "grey ore" is not an exception on the mother lode. It is the rule. Comparison with the ore worked at the Utica mine, Angels Camp, on the mother lode, about 30 miles distant, shows it to be identical in character. The same grey ore exists in the Kennedy mine, in the Wildman mine and in many other mines extending from Tuolumne county into El Dorado county. The great bonanza ore bodies of the Utica mine have been this ore. It is the persistent characteristic ore of the mother lode fissure. It is probable that to the exceptional extent and richness of the west or Keystone vein is in reality due the long continued overlooking of the greater ore deposit of the main mother lode vein.

The workings of the west and middle veins and of the foot and hanging wall seams of the main vein have practically opened the latter to 1000 feet of

depth. The crosscuts made in the old workings and the exploration drifting of the last three years since the discovery have developed a known linear extent of lode of 2100 feet. The developed width ranges up to nearly 200 feet, and may average 100 feet. The depth obtained in the Kennedy and Eureka mines may be safely anticipated in this. The half-tone showing the stope face on the 500 level south shows 96 feet width of ore. The half-tone on page 207 showing the double track on the 300 level north illustrates again the magnitude of the great lode.

A test run of 1000 tons made on the grey ore yielded $5.30 per ton. Average assays from 10 or 15 feet thickness run between $9 and $10 to the ton. Some extremely rich pockets of specimen ore have been taken out; one in 1899 yielded $25,000.

The cost of working, mining and milling with the present plant—steam-power hoist and water-power 40-stamp mill—is from $2.36 to $2.46 a ton. The company has recently let a contract to replace it by a new 60-stamp mill of heavier stamps, and have arranged to substitute cheaper electric power for the steam and water power now employed. The economies that will result with the improvements and changes are expected to materially reduce the operative costs. It is believed that the conditions will then be so far favorable that the record figure of low operative costs of quartz gold mining can be reached.

The Keystone mine has had an exceptional history covering all the years of California gold mining. It is not, however, so exceptional but that the advance of our knowledge of the mother lode may not in time prove that there are others, that have only been dormant possibilities, waiting the application of the same inductive logic and broad generalizations to become appreciated as being as great mines as the Keystone promises to be.

Value of a Theory.*

It is the object of experiment to discover the facts that stud any region of nature—to chip away every encasing substance and lay bare the immutable kernel for contemplation by the mind: it is the province of theory to exercise the imagination and reason upon the relative bearing of these facts—to explain them—to weave about them a fabric whose design shows order, regularity and sequence, rather than mere agglomeration—to make this mantle of such form and size that, without undue stretching and piecing, it will cover new facts as they arise, and that others, obviously related to their predecessors, will not rend it.

A theory, besides thus affording a rational mental view of grouped phenomena, has the further value of pointing out the way in which new discoveries lie, and even sometimes of predicting the very nature of the facts to be found.

Facts are the isolated ingredients of which a theory may be compounded; and although the theory may be crude in the first workman's hands, still others of more skill continually arise, until at last a genius gives it a touch, and we have a masterpiece, as in the grand triplet of electricity-magnetism-luminosity—a combined wave motion—growing out of the simple undulatory theory of light.

* T. A. LYONS in Electromagnetic Phenomena and Deviations of the Compass.

Neocene Middle Fork of American River.

From Colfax Folio U. S. Geological Atlas.

There is not the slightest doubt that a river corresponding roughly to the present Middle Fork of the American had its source near Castle Peak, thence flowed across to Soda Springs and approximately followed the present Middle Fork, entering this (Colfax) quadrangle under the ridge between Long canyon and the Middle Fork, and in the southern portion of this ridge curving into the Placerville quadrangle. It entered the Colfax quadrangle again a few miles west of this, and the channel emerged from under the volcanic capping at Ralston's. A tributary from the Duncan Peak region joined it with a general southerly direction. From Ralston's much of it is eroded, but it may be regarded as certain that the main channel continued westward, touching Michigan Bluff and Sage hill, here receiving an important tributary running nearly due south from Damascus. The deposits of this latter channel are preserved below the lava ridge between Damascus and Gas Hill. Near the latter point it receives a tributary from Last Chance and Deadwood.

Again, east [west.—ED.] of Michigan Bluff the channel is eroded; but it is certain that its continuation is found at Bath, whence the main channel ran through to Mayflower. Here it made a wide curve and ran southward to Forest Hill and the Dardanelles. Thus far the general course is outlined without uncertainty, but from here on the difficulties begin. This main channel is marked by its heavy deposits of gravel and clay and its broad, well-defined channel. Under the southwestern prolongation of the Forest Hill lava ridge nothing has thus far been found which would indicate that the main old river channel flowed down in this direction. It is true that a narrow channel of the intervolcanic epoch continues down in this direction; but these channels were notably independent of the older and main drainage basins. The intervolcanic channels were excavated after a large part of the old river basins had been filled by accumulations of silt and volcanic mud, and probably also after the tilting of the Sierra Nevada had taken place. Their direction, then, offer no criterion of the pre-volcanic drainage lines. It would certainly seem as if some fragments of the accumulations of the old channels would have been preserved southwest of the Dardanelles had the channel taken this course. The gravels exposed at Todd Valley offer no solution of the problem, for they are at a higher level and evidently represent a bench filled with gravel after the clogging of the main channel.

There is, however, a solution of this problem which is advanced as having many plausible points, though it cannot be said to be free from all objections. This is that the old channel of the Forest Hill divide emerges at Yankee Jims and Georgia Hill, and that its course from there is northward to Wisconsin Hill, thence through the lava ridge and curving eastward to the Morning Star mine, thence to Iowa Hill, crossing the canyon of the present river to Indiana Hill, and from there northward to Dutch Flat, whence its course has already been established. This hypothesis, in the first place, necessitates the existence of a deep and continuous channel between Dutch Flat and Indiana Hill. That such a deep channel exists appears now very probable, and may be regarded as certain, if the developments south of Dutch Flat in Squires canyon will show the existence of a deep trough at this place, which it has been asserted was found by the explorations. One of the principal difficulties appears to be the fact that the gravel at Georgia Hill and Yankee Jims differs somewhat in character from that of the Mayflower and Forest Hill. This may be explained by the fact that the river at this point spreads over a larger and flatter bottom, which would naturally influence the character of its deposit.

The difficulty which at first glance appears to be an insuperable one, i. e., that of the grades, on closer examination converts itself into an argument in favor of this hypothesis. From the Dardanelles to Yankee Jim is a slight grade which is sufficient for the requirements. From Yankee Jims to Wisconsin Hill the channel would at present have a slight upward grade. From Wisconsin Hill to Iowa Hill it is approximately level. From Iowa Hill to Indiana Hill it has a slight southward grade, and similarly from Dutch Flat to Indiana Hill is a grade which, though slight is opposite to that which the river, according to this hypothesis, would have had.

From Yankee Jims to Dutch Flat the Neocene river would have pursued a nearly due northerly course; now it is likely that this river from Yankee Jims to Dutch Flat had originally a very slight grade northward, similar to that of the Neocene river between You Bet and North Columbia. Examinations of channels in various parts of the Sierra Nevada have shown the occurrence of a tilting movement which has affected the grades of the channels according to their direction. Channels running north-northwest to south-southwest would retain their original slight grade. Those running west of this line would have their grades materially increased by the tilting. On the other hand, those flowing in a more or less easterly direction from this axis of tilting would have their grade decreased or even reversed. A close examination of the elevations of Indiana Hill, Dutch Flat, Iowa Hill, Wisconsin Hill and Yankee Jims, will show that in fact the present level character or slight southward grade of these channels is exactly what would follow if the Neocene river, with a northerly course, had participated in a westward tilting of the block of the Sierra Nevada amounting to about 60 or 70 feet per mile.

If this hypothesis be true, it solves in an exceedingly satisfactory way a number of the perplexing problems which were presented by the enormous accumulation of gravels in the drainage of the old Yuba river. It increases vastly the watershed of the Neocene stream, which as now outlined extends from the headwaters of the North Fork to the Yuba. The waters of all this territory found an outlet through the narrow channel from North San Juan to Smartsville. In the central part of this drainage area longitudinal depressions existed, bordered on the west by the high diabase ridges of the foothills. All these conditions naturally tended greatly to increase the accumulation of gravels. What has formerly been supposed to be the North Fork of the Neocene American river now becomes the South Fork of the great Neocene Yuba river. The Neocene American river is reduced in size and consists only of the stream coming down from Pyramid Peak by way of Placerville.

[The hypothesis suggested by the writer seems insufficiently sustained by facts to warrant the change from the opinion expressed by him some years ago in a publication entitled "Two Neocene Rivers of California." The tilting which would have the effect on the old gradients which he has described, undoubtedly has taken place. There is much geological evidence to sustain it. The area west and southwest of the Dardanelles mine has not been explored beneath the lava. In that mine the old Neocene channel turned northwest, but is cut across almost at the beginning of the turn by an intervolcanic channel running southeast at the point of crossing, but which must within a short distance turn west or northwest. The old Neocene channel has not been connected across this cut, no effort having been made to that end. So far the writer's theory is not negatived. But 2 miles southwest of the Dardanelles, at Spring Garden, there are channel remnants, long since mined out, that possess the characteristic physical appearance of the old Neocene channel. They are fragmentary, but there is no reason why the intervolcanic channel could not have as completely eroded and occupied the situs of the old Neocene channel as the existing channels have eroded and occupied the lines of both the old Neocene and its intervolcanic successors. At Jones Hill, 3 miles farther south, is another remnant of an old Neocene river bed. Physically, it belongs to the main Neocene channel, just as the remnants at Spring Garden do. Whether or not the old Neocene channel was as richly gold-bearing as in the Dardanelles and other mines above, is a question aside from the identity of the old channel line of flow. Mr. Lindgren does not in his statement in the Colfax Folio break down the logic of his other statement in "Two Neocene Rivers." The best that can be said for the hypothesis he now advances is that it is possible.—ED.]

PROF. GEORGE T. WRIGHT of Oberlin College, Ohio, recently returned from geological explorations in northern Siberia, says there are no marks of the glacial period in that country. [Probably the reference is to such glaciation as the ice movement has left on the rocks of Ohio and other Eastern States. Mining engineers who have been to the same country have confirmed this in papers specially prepared for this paper, but have pointed out as well that there were other evidences than marks of ice movement, which indicated that the Glacial period covered Siberia with ice just exactly as it covered northern Europe and northern America.—ED.]

THE State of Texas has appropriated $10,000 a year for two years to have made a geological and mineralogical survey of the school lands belonging to the State. The regents of the State University have charge of the work. Persons employed in the survey must have had five years experience in chemistry, geology and mineralogy. The statistics and information gathered are to be published. A penalty is provided for the disclosure of any information obtained during the work except through publications for the general benefit.

The Wonderful Becquerel Ray.

Written for the MINING AND SCIENTIFIC PRESS by EDWARD BOOTH.

A recent telegram from Washington announced that the State Department had just received official information from Germany that recent investigations were in progress at Berlin on the "Becquerel ray." The telegram refers to the "Becquerel ray" as somewhat similar to the celebrated Roentgen or X rays, and says "the experiments are said to have disclosed the fact that an entirely new element is responsible for the Becquerel rays, and that they render almost every transparent substance luminous in the darkness. The new rays make it possible to tell genuine diamonds from artificial ones in the dark. The experiments, it is stated, also have demonstrated that rays emanating from a large quantity of the new element make the air such a conductor of electricity as to promise that the property can be utilized in wireless telegraphy."

Whether the Becquerel rays can ever be used in the practical way indicated by the above telegram remains to be determined. Perhaps the experiments now in progress at Berlin may lead to some such results. But, whether they do or not, the fact remains that the discovery of the Becquerel rays furnished another problem for scientists to solve; and, although many explanations have been suggested, it still remains unsolved.

As the Washington telegram says, the Becquerel rays are somewhat similar to the Roentgen ray, and their discovery resulted from investigations conducted to determine the characteristics of these latter rays. It is only a few years ago that the discovery of the Roentgen ray astounded the world. The first telegrams announcing that the coins inside a purse had been photographed by this new ray, that it was able to penetrate many opaque materials, was received with incredulity except by the very few who knew of previous work in this direction. And when it was found that not only could a living man's skeleton be photographed, but that it could be actually looked at and its imperfections investigated, it seemed as if the limit in this direction had been reached.

Henri Becquerel, the eminent French scientist, was one of those who became profoundly interested in these discoveries. The Roentgen rays are given off when an electrical current is passed through a vessel from which nearly all the air has been removed. Ordinary air is an extremely poor conductor of electricity—almost an absolute non-conductor—but when it becomes rarified it allows the passage of the current much more readily. The current passing through these vessels of rarified air (technically called Crooke's tubes) emits comparatively little light, but gives off in great abundance these non-luminous Roentgen rays, which have a chemical effect similar to the light rays in the silver salts and consequently make photography by this means possible. These are the rays that pass through many opaque substances and that have already proved of inestimable value in medicine.

These rays have the property of making many substances fluorescent. Fluorescence is very similar to phosphorescence, the substance possessing it having peculiar luminous properties. It was while investigating this latter property that Becquerel found that the element uranium had the property of giving out rays with nearly all the properties of the Roentgen rays. The peculiar fluorescent properties of the uranium salts have long been known, and have been used in a practical way in glass making, where a yellow uranium glass with a greenish opalescence has often been employed for ornamental purposes. But Becquerel was the first to ascertain that this fluorescent property was inherent to the element itself, and that it was more strongly manifested in the pure element than in any of its compounds. This peculiar property was found not to consist merely in the visible manifestations, but to have a far deeper power. It was found that if uranium or its compounds were taken into a photographer's dark room, and placed on a sensitive paper, which had previously been wrapped in black light-proof covering, the paper would in the course of a few hours be affected as if it had been exposed to the light. That is to say, uranium gives off rays having the same power as the Roentgen rays, of penetrating opaque materials.

Moreover, one of the most notable characteristics of the Roentgen ray is its ability to make air and other gases good conductors of electricity. As stated above, air under ordinary conditions is a non-conductor. But, when subjected to the action of the Roentgen ray, its character in this respect is completely changed and it becomes a good conductor. The rays from uranium were found to have this property, also—another point of similarity with the Roentgen ray.

The discovery of these peculiar rays—which were promptly named after their discoverer—increased the interest felt in this whole subject and was quickly followed by the discovery of like properties, to a less extent, in thorium, and, to a very much less extent, in tantalum.

Other investigators took up the work, and with even more astonishing results. One of the principal sources of uranium is the mineral pitchblende, an impure oxide of uranium, containing a variety of rare elements. Two French chemists, P. Curie, and his wife, Mdme. Sklodowska Curie, investigating the rays given out by the natural mineral, found them more powerful than those of pure uranium. This was in direct contradiction to the discoveries of Becquerel, who had found uranium more powerful than any of its compounds. The only explanation that could be suggested was that, besides uranium, pitchblende must contain some element still more active. After considerable work, the Curies succeeded in obtaining what they claim to be two new elements. One, which resembles bismuth very closely, they named polonium, after Poland, the native land of Mdme. Curie, and the other they called radium, on account of its wonderful power of emitting these curious Becquerel rays. Chemically, radium so closely resembles barium that many chemists still refuse to admit that there is any difference between them.

Subsequently another French chemist, A. Debierne, found still another active body in pitchblende, and he, claiming it to be a new element, named it actinium. It is remarkably like titanium in its chemical behavior.

So within the last four or five years three substances, claimed as new elements, have been found, each possessing this peculiar property of emitting these remarkable rays, and each of them vastly more powerful than uranium, the substance in which these rays were first discovered.

The characteristics of these Becquerel rays are these:

1. They traverse opaque objects.
2. They affect photographic plates, showing that they have chemical power.
3. They make air and other gases conductors of electricity.
4. They make various substances phosphorescent when they come in contact with them.
5. They can impart their own properties to other substances with which they have been in contact, so that these substances are able for a considerable time to give out similar rays.
6. The rays are affected by a magnet, and can in this way be turned from their true course.
7. This power is apparently an inherent property of the element, as it remains with it, notwithstanding the chemical changes to which it may be subjected.
8. This power does not depend on any previous exposure to light, as in the case of ordinary phosphorescent substances. These radio-active materials have the same effect on photographic plates after having been kept for months or for years in the dark.

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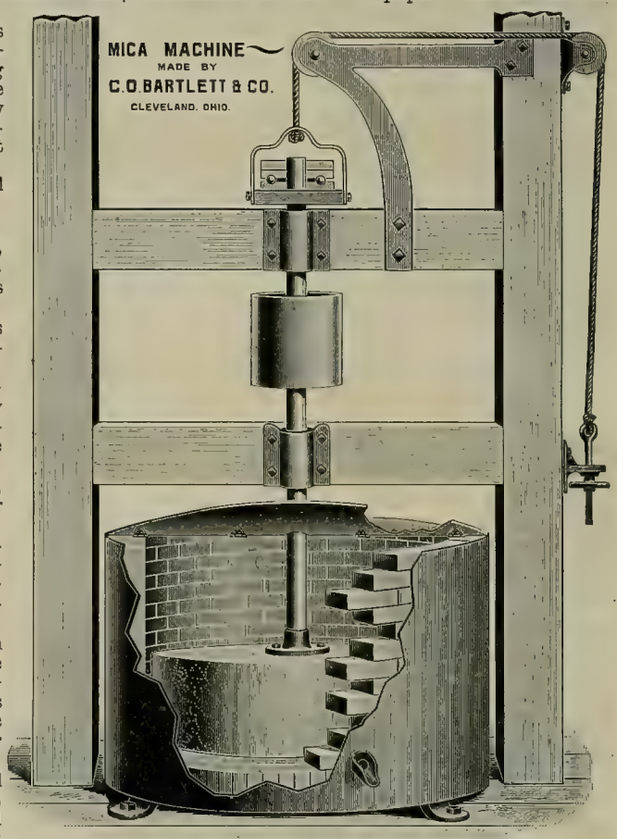
Various theories have been advanced in explanation of these rays, but so far they are all mere theories. Perhaps the commission now engaged in the investigation in Berlin will be able to throw light on the matter.

Mica Grinding Mill.

The increase in the use of ground mica has made a demand for special machinery for doing the grinding. The process of making mica flour, or ground mica, is as follows: First, the mica as it comes from the mine is sorted, some of the large pieces being sorted and split into isinglass. The trimmings of these and the small pieces are thoroughly washed in a special machine and ground in the mica mill until it is in the form of a paste. It is then drawn off into pans, dried, crushed, reground in a dry buhr mill and finally bolted, as is done with flour. This ground mica is used, among other uses, especially in the manufacture of fine wall paper. The cut shows a



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Recovery of Cyanide.

TO THE EDITOR:—I think the statement in "Concentrates" in the issue of the 20th, that "cyanide might be precipitated by zinc sulphate, but that it is believed to be too expensive," might be amended by saying that in the majority of cases any process to recover cyanide would be too expensive to warrant the erection of a recovery plant. There are many plants running in which the total consumption of cyanide is less than one pound per ton of pulp treated. It can, therefore, be easily understood that the margin for the profitable recovery of cyanide in these instances is very small.

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evolved absorbed in caustic soda, forming alkaline cyanide again. The zinc sulphate remaining in the still can then be used to precipitate more cyanide solution. Sulphuric acid and caustic alkali, therefore, are the only chemicals consumed in the process, so that the cost is low and should not exceed 15 cents per pound of cyanide consumed.

This process was tried experimentally at a tailings plant in Arizona, where the accumulation of copper in the soution had given us a great deal of trouble. It worked perfectly, but as the consumption of cyanide was less than one and one-half pounds per ton of tailings the owners did not think it was worth while going to the expense of erecting a permanent recovery plant.

The value of a recovery process depends on the price of cyanide, and when that is less than 30 cents a pound the margin for profitable recovery is not at all large, except under very unusual circumstances, where comparatively strong solutions of cyanide are used. BERTRAM HUNT.

San Francisco, April 20.

There are some exceptional cases where the cyanide process is used where as much as $3.50 cost of cyanide is employed per ton of tailings treated. It would seem that a recovery of the cyanide at a charge of one-half this sum would prove quite profitable.—ED.]

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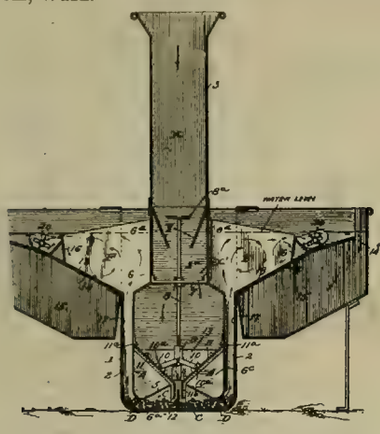
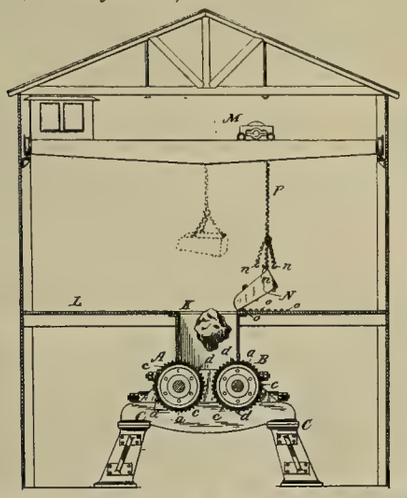
AMALGAMATOR.—No. 672,740; L. Mayhew, New Whatcom, Wash.



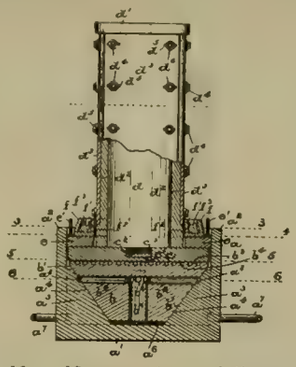
having dished portions 14; riffle plate 16, loosely mounted upon each bottom 14; well extending the full length of pan; hopper having its lower portion fitted within well to form side passages for between it and well walls, bottom of hopper having the form of an inverted dish shape, hopper having a flange extending its full length; and series of plates fixedly connected to hopper, plates portions forming transverse partitions equal transverse area of panning spaces above plates 14, having pendent members adapted to spaces and having foot portions extending under dished bottom of hopper, foot portions being means for supporting hopper within well and partitions being detachably mounted within well.

METHOD OF BREAKING ROCK.—No. 672,616; T. A. Edison, Llewellyn Park, N. J.



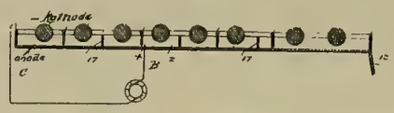
Method of breaking rock consisting in driving pair of independently driven and disconnected massive rolls at high speed by means of small power capable of running rolls up to speed when no work is being done, partially arresting the motion of rolls by successively and periodically delivering charges of rock to them, thereby breaking rock by kinetic energy, and restoring speed of rolls during the intervals.

MEANS FOR CASTING INGOTS.—No. 672,447; A. J. Lustig, Newark, N. J.



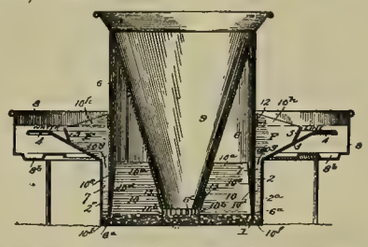
Ingot mold, mold support, consisting essentially of chambered base, having internal supporting ribs, a loose material, which is a non-conductor of heat in base plate or foundation, means for conducting reducing gas into same, mold support on ribs, having gas passages or ducts, supporting plate c having central depression, and plate therein made of refractory material, all arranged for support of ingot mold and for retaining gas in base while mold is cold, but permit it to pass through supports when heated by molten metal, and frame-like receptacle having perforations and constructed to contain a carbonaceous material, arranged upon mold support.

AMALGAMATOR.—No. 672,524; G. Ghiglieri and J. M. Schofield, Stockton, Cal.



A stationary frame, a suspended tray provided with fixed partitions and depending post, series of amalgam rollers and aprons suspended in tray; in combination with driving shaft, gear wheel fixed thereon and wrist pin carried by gear wheel, a countershaft and crank and pinion fixed on countershaft, pinion being in mesh with gear wheel, a crank lever fulcrumed in frame and having one arm operatively connected to crank and the other to tray.

AMALGAMATOR.—No. 672,739; L. Mayhew, New Whatcom, Wash.

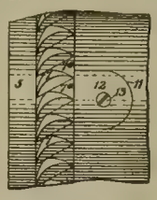


Pan having fixedly held vessel in nature of pan having central well and side portions having dished bottom, flange 5, projected up from dished bottom, and an inner vessel comprising cylinder 6, of less diameter than well, cylinder being adapted to fit in well, whereby vertical discharge passage is produced between wall of well and cylinder, inner vessel also including an inverted cone-shaped hopper 9, lower end of which terminates above bottom of well; in combination with series of partition plates, each comprising upper outwardly extending member 10, adapted to rest upon dished bottom and abut flange 5, a vertical member 10^c, adapted to extend down and fit within discharge passage between cylinder 6 and well wall, member 10^c, being of length to extend down and rest upon bottom of well, member 10^e, terminating in inwardly extending seat portion 10^f, which forms a rest for bottom of cylinder 6, member 10^g, merging with member 10^h, that extends upward into cylinder 6, and has inner edge arranged to engage and form seat for lower end of cone member 9, and means for holding several plates 10 in their proper vertical positions.

PROCESS OF TREATING ZINC-BEARING ORES FOR OBTAINING ZINC, ETC.—No. 672,637; S. O. Cowper-Coles, London, England.

The treatment of complex zinc ores, such as those known as Broken Hill ore, consisting in first roasting, crushing and screening ore, placing it in vats and washing with water, afterward run into an evaporating pan, leaching ore with a weak solution of sulphuric acid to abstract zinc and copper, passing solution containing zinc sulphate and copper sulphate through a body of carbon and an electropositive metal to recover copper, electrolyzing remaining solution to recover zinc, again washing ore with water which is afterward also run into evaporating pan, treating ore with a solution of caustic soda to extract lead in form of sodium plumbate, electrolyzing solution to recover metallic lead, and leaching remaining ore in vats with potassium cyanide and subsequently electrolyzing solution to recover metallic silver and gold.

FLUID PRESSURE TURBINE.—No. 672,838; F. Hodgkinson, Wilkinsburg, Pa.



One of the blade supporting members of which is provided with undercut grooves and laterally offset insertion recesses and with sets of blades or vanes having integral base blocks that are removably fitted into and completely fill grooves, and locking blocks fitting into recesses.

PROCESS OF WELDING ALUMINUM AND ALUMINUM ALLOYS.—No. 672,744; M. Schmidt, Berlin, Germany.

Welding aluminum and aluminum alloys consisting in applying to heated edges of aluminum a solid body of high fusion point which forms part of an electric circuit that includes parts to be welded and moving body along between edges for purpose of removing oxide therefrom both mechanically and electrolytically.

Tamping in Blasting.

TO THE EDITOR:—I read an article recently in the MINING AND SCIENTIFIC PRESS in regard to tamping dynamite in blasting holes, in which the writer asks if it is necessary, and, if so, why? In a varied experience of twenty years in Montana, I spent eight of them in working as a quartz miner, and I have often asked the same question as the writer, and, where the answer was in favor of tamping, I always failed to get a satisfactory reason in support of that theory. I have always maintained that tamping of any kind on dynamite or giant powder was superfluous, and have proved my theory on many occasions in working with partners who insisted that tamping was necessary to obtain the full effect of the powder. As far as could be judged, the visible effect was the same in all kinds of rock, with the powder tamped or untamped. My mining experience commenced without any prejudice in this matter, engendered by a former use of black powder, and I am inclined to think that this is the reason why so many miners of long experience still cling to the habit of tamping, it having become a habit through the use of the black powder.

While it has been my experience that not one valid reason can be advanced why dynamite should be tamped, there are many reasons why it should not. First and foremost, safety to the workman; missed holes are a common occurrence, and very little risk is encountered in going into a missed hole that is not tamped, as it is only a second's work to remove the fuse and cap and insert another. This reason alone is sufficient to commend the practice to any intelligent miner. I will state that it is my practice to insert a rag in the mouth of the hole, in order to hold the fuse and also to keep the dirt from filling the hole. There is also a large saving of time in loading a round of holes.

I have worked in all kinds of rock, used both fuse and battery in discharging, and have always found that the amount of work done compared well with that of miners wedded to the tamping theory. My experience with explosives has been limited to that known as giant powder, Nos. 1, 2 and 3, mainly No. 2. I would like very much to hear the views of other miners in this matter. R. H. BEMIS.

Belt, Mont., April 27.

THE comparative costs of manufacture of iron and steel in Great Britain using Bilboa (Spanish) ore, and America using Lake Superior ore, work out approximately as follows, at the average normal price paid for ore, coal and wages per ton of 2240 pounds: Britain, with Bilboa ore at $3.62 at the furnace: Ore, two tons 50% to 55% iron at $3.62, $7.24; coke, 1.25 tons at $2.42, $3.03; limestone, labor, coal, repairs, etc., $1.81; total, $12.08; conversion into rails, bars, etc., $6.05, making $18.13. America, with ore at $2.42 at the furnace: Ore, 65%, 1.75 tons at $2.42, $4.23; coke, .8 ton at $1.81, $1.45; limestone, labor, etc., $1.51; total, $7.19; conversion into rails, etc., $4.84, making $12.03.—E. Phillips in The Engineering Magazine.

IT is proposed on the electric railway between Berlin and Hamburg to obtain speeds of 125 to 150 miles an hour for passenger trains, but freight trains will be moved by steam as before. The passenger cars will be dispatched singly at intervals of ten minutes and will make the journey in a little over an hour.

The Wonderful Becquerel Ray.

Written for the MINING AND SCIENTIFIC PRESS by EDWARD BOOTH.

A recent telegram from Washington announced that the State Department had just received official information from Germany that recent investigations were in progress at Berlin on the "Becquerel ray." The telegram refers to the "Becquerel ray" as somewhat similar to the celebrated Roentgen or X rays, and says "the experiments are said to have disclosed the fact that an entirely new element is responsible for the Becquerel rays, and that they render almost every transparent substance luminous in the darkness. The new rays make it possible to tell genuine diamonds from artificial ones in the dark. The experiments, it is stated, also have demonstrated that rays emanating from a large quantity of the new element make the air such a conductor of electricity as to promise that the property can be utilized in wireless telegraphy."

Whether the Becquerel rays can ever be used in the practical way indicated by the above telegram remains to be determined. Perhaps the experiments now in progress at Berlin may lead to some such results. But, whether they do or not, the fact remains that the discovery of the Becquerel rays furnished another problem for scientists to solve; and, although many explanations have been suggested, it still remains unsolved.

As the Washington telegram says, the Becquerel rays are somewhat similar to the Roentgen ray, and their discovery resulted from investigations conducted to determine the characteristics of these latter rays. It is only a few years ago that the discovery of the Roentgen ray astounded the world. The first telegrams announcing that the coins inside a purse had been photographed by this new ray, that it was able to penetrate many opaque materials, was received with incredulity except by the very few who knew of previous work in this direction. And when it was found that not only could a living man's skeleton be photographed, but that it could be actually looked at and its imperfections investigated, it seemed as if the limit in this direction had been reached.

Henri Becquerel, the eminent French scientist, was one of those who became profoundly interested in these discoveries. The Roentgen rays are given off when an electrical current is passed through a vessel from which nearly all the air has been removed. Ordinary air is an extremely poor conductor of electricity—almost an absolute non-conductor—but when it becomes rarified it allows the passage of the current much more readily. The current passing through these vessels of rarified air (technically called Crooke's tubes) emits comparatively little light, but gives off in great abundance these non-luminous Roentgen rays, which have a chemical effect similar to the light rays in the silver salts and consequently make photography by this means possible. These are the rays that pass through many opaque substances and that have already proved of inestimable value in medicine.

These rays have the property of making many substances fluorescent. Fluorescence is very similar to phosphorescence, the substance possessing it having peculiar luminous properties. It was while investigating this latter property that Becquerel found that the element uranium had the property of giving out rays with nearly all the properties of the Roentgen rays. The peculiar fluorescent properties of the uranium salts have long been known, and have been used in a practical way in glass making, where a yellow uranium glass with a greenish opalescence has often been employed for ornamental purposes. But Becquerel was the first to ascertain that this fluorescent property was inherent to the element itself, and that it was more strongly manifested in the pure element than in any of its compounds. This peculiar property was found not to consist merely in the visible manifestations, but to have a far deeper power. It was found that if uranium or its compounds were taken into a photographer's dark room, and placed on a sensitive paper, which had previously been wrapped in black light-proof covering, the paper would in the course of a few hours be affected as if it had been exposed to the light. That is to say, uranium gives off rays having the same power as the Roentgen rays, of penetrating opaque materials.

Moreover, one of the most notable characteristics of the Roentgen ray is its ability to make air and other gases good conductors of electricity. As stated above, air under ordinary conditions is a non-conductor. But, when subjected to the action of the Roentgen ray, its character in this respect is completely changed and it becomes a good conductor. The rays from uranium were found to have this property, also—another point of similarity with the Roentgen ray.

The discovery of these peculiar rays—which were promptly named after their discoverer—increased the interest felt in this whole subject and was quickly followed by the discovery of like properties, to a less extent, in thorium, and, to a very much less extent, in tantalum.

Other investigators took up the work, and with even more astonishing results. One of the principal sources of uranium is the mineral pitchblende, an impure oxide of uranium, containing a variety of rare elements. Two French chemists, P. Curie, and his wife, Mdme. Sklodowska Curie, investigating the rays given out by the natural mineral, found them more powerful than those of pure uranium. This was in direct contradiction to the discoveries of Becquerel, who had found uranium more powerful than any of its compounds. The only explanation that could be suggested was that, besides uranium, pitchblende must contain some element still more active. After considerable work, the Curies succeeded in obtaining what they claim to be two new elements. One, which resembles bismuth very closely, they named polonium, after Poland, the native land of Mdme. Curie, and the other they called radium, on account of its wonderful power of emitting these curious Becquerel rays. Chemically, radium so closely resembles barium that many chemists still refuse to admit that there is any difference between them.

Subsequently another French chemist, A. Debierne, found still another active body in pitchblende, and he, claiming it to be a new element, named it actinium. It is remarkably like titanium in its chemical behavior.

So within the last four or five years three substances, claimed as new elements, have been found, each possessing this peculiar property of emitting these remarkable rays, and each of them vastly more powerful than uranium, the substance in which these rays were first discovered.

The characteristics of these Becquerel rays are these:

1. They traverse opaque objects.
2. They affect photographic plates, showing that they have chemical power.
3. They make air and other gases conductors of electricity.
4. They make various substances phosphorescent when they come in contact with them.
5. They can impart their own properties to other substances with which they have been in contact, so that these substances are able for a considerable time to give out similar rays.
6. The rays are affected by a magnet, and can in this way be turned from their true course.
7. This power is apparently an inherent property of the element, as it remains with it, notwithstanding the chemical changes to which it may be subjected.
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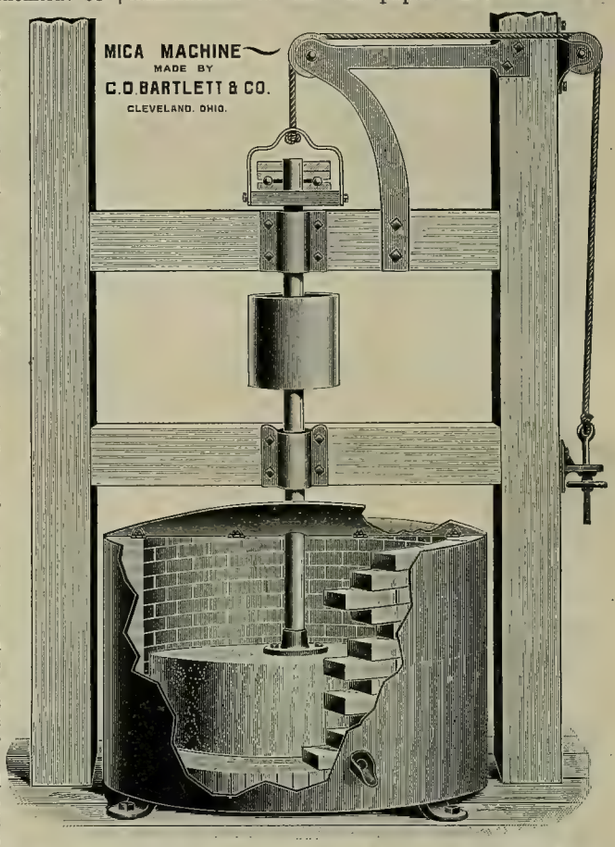

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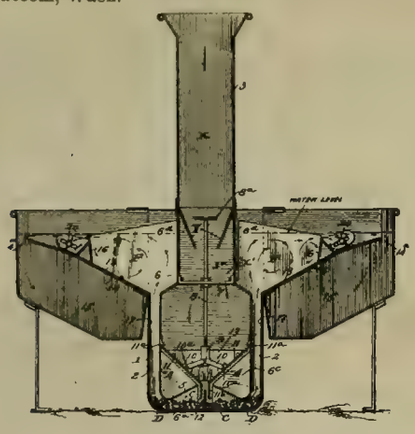
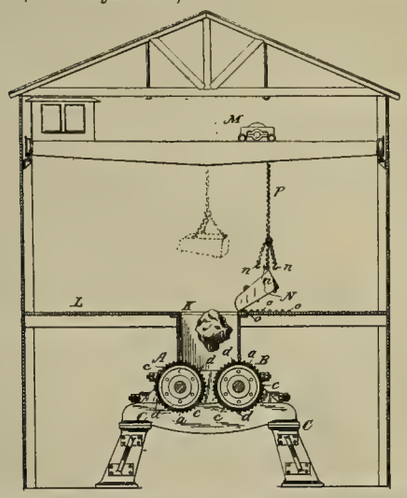


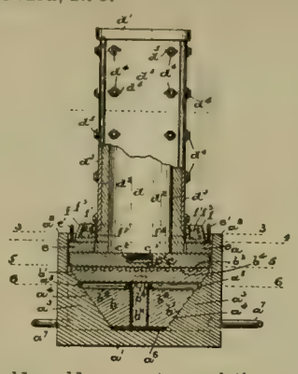
A pan having dished portions 14; riffle plate 16, adjustably mounted upon each bottom 14; well extending full length of pan; hopper having its lower portion fitted within well to form side passages for outflow between it and well walls, bottom of hopper being made of an inverted dish shape, hopper having discharge extending its full length; and series of partition plates fixedly connected to hopper, plates having portions forming transverse partitions extending full transverse area of panning spaces above pan portions 14, having pendent members adapted to fit outflow spaces and having foot portions extending inwardly under dished bottom of hopper, foot portions forming means for supporting hopper within well, hopper and partitions being detachably mounted within well.

METHOD OF BREAKING ROCK.—No. 672,616; T. A. Edison, Llewellyn Park, N. J.



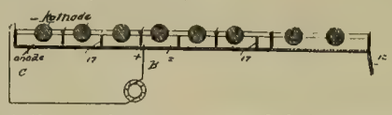
Method of breaking rock consisting in driving pair of independently driven and disconnected massive rolls at high speed by means of small power capable of running rolls up to speed when no work is being done, partially arresting the motion of rolls by successively and periodically delivering charges of rock to them, thereby breaking rock by kinetic energy, and restoring speed of rolls during the intervals.

MEANS FOR CASTING INGOTS.—No. 672,447; A. J. Lustig, Newark, N. J.



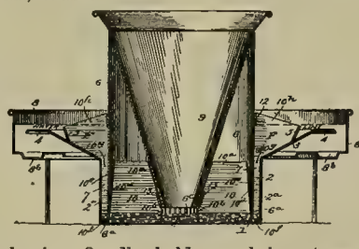
Ingot mold, mold support, consisting essentially of chambered base, having internal supporting ribs, a loose material, which is a non-conductor of heat in base plate or foundation, means for conducting reducing gas into same, mold support on ribs, having gas passages or ducts, supporting plate c having central depression, and plate therein made of refractory material, all arranged for support of ingot mold and for retaining gas in base while mold is cold, but permit it to pass through supports when heated by molten metal, and frame-like receptacle having perforations and constructed to contain a carbonaceous material, arranged upon mold support.

AMALGAMATOR.—No. 672,524; G. Ghiglieri and J. M. Schofield, Stockton, Cal.



A stationary frame, a suspended tray provided with fixed partitions and depending post, series of amalgam rollers and aprons suspended in tray; in combination with driving shaft, gear wheel fixed thereon and wrist pin carried by gear wheel, a countershaft and crank and pinion fixed on countershaft, pinion being in mesh with gear wheel, a crank lever fulcrumed in frame and having one arm operatively connected to crank and the other to tray.

AMALGAMATOR.—No. 672,739; L. Mayhew, New Whatcom, Wash.

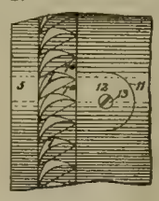


Pan having fixedly held vessel in nature of pan having central well and side portions having dished bottom, flange 5, projected up from dished bottom, and an inner vessel comprising cylinder 6, of less diameter than well, cylinder being adapted to fit in well, whereby vertical discharge passage is produced between wall of well and cylinder, inner vessel also including an inverted cone-shaped hopper 9, lower end of which terminates above bottom of well; in combination with series of partition plates, each comprising upper outwardly extending member 10, adapted to rest upon dished bottom and abut flange 5, a vertical member 10^c, adapted to extend down and fit within discharge passage between cylinder 6 and well wall, member 10^c, being of length to extend down and rest upon bottom of well, member 10^c, terminating in inwardly extending seat portion 10^f, which forms a rest for bottom of cylinder 6, member 10^c, merging with member 10^h, that extends upward into cylinder 6, and has inner edge arranged to engage and form seat for lower end of cone member 9, and means for holding several plates 10 in their proper vertical positions.

PROCESS OF TREATING ZINC-BEARING ORES FOR OBTAINING ZINC, ETC.—No. 672,637; S. O. Cowper-Coles, London, England.

The treatment of complex zinc ores, such as those known as Broken Hill ore, consisting in first roasting, crushing and screening ore, placing it in vats and washing with water, afterward run into an evaporating pan, leaching ore with a weak solution of sulphuric acid to abstract zinc and copper, passing solution containing zinc sulphate and copper sulphate through a body of carbon and an electropositive metal to recover copper, electrolyzing remaining solution to recover zinc, again washing ore with water which is afterward also run into evaporating pan, treating ore with a solution of caustic soda to extract lead in form of sodium plumbate, electrolyzing solution to recover metallic lead, and leaching remaining ore in vats with potassium cyanide and subsequently electrolyzing solution to recover metallic silver and gold.

FLUID PRESSURE TURBINE.—No. 672,838; F. Hodgkinson, Wilkinsburg, Pa.



One of the blade supporting members of which is provided with undercut grooves and laterally offset insertion recesses and with sets of blades or vanes having integral base blocks that are removably fitted into and completely fill grooves, and locking blocks fitting into recesses.

PROCESS OF WELDING ALUMINUM AND ALUMINUM ALLOYS.—No. 672,744; M. Schmidt, Berlin, Germany.

Welding aluminum and aluminum alloys consisting in applying to heated edges of aluminum a solid body of high fusion point which forms part of an electric circuit that includes parts to be welded and moving body along between edges for purpose of removing oxide therefrom both mechanically and electrolytically.

Tamping in Blasting.

TO THE EDITOR:—I read an article recently in the MINING AND SCIENTIFIC PRESS in regard to tamping dynamite in blasting holes, in which the writer asks if it is necessary, and, if so, why? In a varied experience of twenty years in Montana, I spent eight of them in working as a quartz miner, and I have often asked the same question as the writer, and, where the answer was in favor of tamping, I always failed to get a satisfactory reason in support of that theory. I have always maintained that tamping of any kind on dynamite or giant powder was superfluous, and have proved my theory on many occasions in working with partners who insisted that tamping was necessary to obtain the full effect of the powder. As far as could be judged, the visible effect was the same in all kinds of rock, with the powder tamped or untamped. My mining experience commenced without any prejudice in this matter, engendered by a former use of black powder, and I am inclined to think that this is the reason why so many miners of long experience still cling to the habit of tamping, it having become a habit through the use of the black powder.

While it has been my experience that not one valid reason can be advanced why dynamite should be tamped, there are many reasons why it should not. First and foremost, safety to the workman; missed holes are a common occurrence, and very little risk is encountered in going into a missed hole that is not tamped, as it is only a second's work to remove the fuse and cap and insert another. This reason alone is sufficient to commend the practice to any intelligent miner. I will state that it is my practice to insert a rag in the mouth of the hole, in order to hold the fuse and also to keep the dirt from filling the hole. There is also a large saving of time in loading a round of holes.

I have worked in all kinds of rock, used both fuse and battery in discharging, and have always found that the amount of work done compared well with that of miners wedded to the tamping theory. My experience with explosives has been limited to that known as giant powder, Nos. 1, 2 and 3, mainly No. 2. I would like very much to hear the views of other miners in this matter. R. H. BEMIS.

Belt, Mont., April 27.

THE comparative costs of manufacture of iron and steel in Great Britain using Bilboa (Spanish) ore, and America using Lake Superior ore, work out approximately as follows, at the average normal price paid for ore, coal and wages per ton of 2240 pounds: Britain, with Bilboa ore at $3.62 at the furnace: Ore, two tons 50% to 55% iron at $3.62, $7.24; coke, 1.25 tons at $2.42, $3.03; limestone, labor, coal, repairs, etc., $1.81; total, $12.08; conversion into rails, bars, etc., $6.05, making $18.13. America, with ore at $2.42 at the furnace: Ore, 65%, 1.75 tons at $2.42, $4.23; coke, .8 ton at $1.81, $1.45; limestone, labor, etc., $1.51; total, $7.19; conversion into rails, etc., $4.84, making $12.03.—E. Phillips in The Engineering Magazine.

IT is proposed on the electric railway between Berlin and Hamburg to obtain speeds of 125 to 150 miles an hour for passenger trains, but freight trains will be moved by steam as before. The passenger cars will be dispatched singly at intervals of ten minutes and will make the journey in a little over an hour.

MINING SUMMARY.

Specially compiled and reported for the MINING AND SCIENTIFIC PRESS.

ALASKA.

Another discovery of rich gold-bearing ore is reported from Crackerjack, on Twelve-mile Arm, Prince of Wales island, near Ketchikan.

A barge load of concentrates from the Treadwell mine has been wrecked in Wrangel Narrows. It is believed that part, if not all, of the cargo will be saved.

ARIZONA.

COCHISE COUNTY.

The erection of the hoist at the new combination shaft at Tombstone has been begun. The shaft will be a four-compartment one, the only one of its size in Arizona.

MOHAVE COUNTY.

It is said the old Juno mine at Chloride may be reopened, the company proposing the erection of a leaching or cyanide plant for treating the ores.

YAVAPAI COUNTY.

W. A. Lester & Co. of Fredonia, N. Y., are said to have bought thirty-eight placer claims in Big Bug district. The purchasers propose to install a steam-shovel and gold-saving plant, using water pumped from Big Bug creek.

CALIFORNIA.

AMADOR COUNTY.

The Doyle mine, near Jackson, has been bonded to San Francisco parties at $50,000, it is said. They are to begin operations by the first of June.

The Moon G. M. Co., Valley Springs, have begun work on the Mefford copper mine in Camp Opra district. They are sinking a shaft, using a whim.

The Chicago M. Co., J. E. Shettle manager, has bought the Price mine, near Plymouth, on the mother lode.

The Amador Queen D. Co. is reopening the Amador Queen No. 2 at Jackson. The mine is to be thoroughly prospected from the bottom of the 1200-foot shaft.

The Phœnix M. Co. is working the old Merrimac gravel mine, at Central Hill.

BUTTE COUNTY.

It is said that the Catskill drift mine at Bangor is to be reopened, the new owners putting on improved machinery and using electric power.——Nine dredgers are operating in the Feather river bed and adjacent in the old low-lying gravels between Biggs and Oroville, and several more are under construction for the same locality.

CALAVERAS COUNTY.

The Del Monte group at Railroad Flat, owned by the Del Monte M. & M. Co. of Jackson, Amador Co., B. C. O'Neill Supt., is being developed by a 220-foot shaft on the ledge and a tunnel running over 300 feet along it. The mill returns have averaged $6.40 a ton on the plates. The company are projecting a 1000-foot tunnel to crosscut the ledges from 400 to 500 feet deep and propose to use air drills in construction.

The old Field mine, near San Andreas, has been bought by M. P. Morgan, D. C. Demarest, G. More, F. C. Benton and others, and work is to commence immediately.

The Haggerman mine, near San Andreas, has been bonded to D. A. Nuner and associates, who will develop it.

The Lone Star mill, West Point, is being repaired to start crushing. In the R. & H. tunnel at a depth of 1230 feet a new ore body has been uncovered. The vein is 4 feet wide and carries considerable sulphurets.

EL DORADO COUNTY.

The Schneider mine, near Placerville, has been bonded by W. C. Bryant to Hayward & Lane. W. I. Smart will be Supt.

HUMBOLDT COUNTY.

The croppings of a copper-bearing ledge traceable for nearly 4 miles, in Mattole valley, have been located by J. C. Hampton, G. C. Douglas and others of Eureka.

F. M. Shideler, manager of the Achison M. Co., has bought for that company the Little River beach sand mine. A new centrifugal pump and a gold-saving machine will be put in to work the sands.

KERN COUNTY.

The War Eagle Co. at Randsburg have a shaft down 100 feet.——The Yellow Poppy and Gray Eagle have two shafts down 106 and 160 feet. The vein is 12 feet wide and said to average $4 a ton.——The last Big Butte clean-up is over $10,000.——A coal vein has been struck 10 miles north of town.

Randsburg, April 30.

MONO COUNTY.

The Sweetwater M. & M. Co. are negotiating to buy a mill for the Sayre mine, near Sweetwater. The principal value of the ore is in silver.

The Southern Con. M. Co. have begun work on the Red Cloud shaft at Bodie. W. H. Metson is secretary and treasurer.

NAPA COUNTY.

The 1900 report of the Boston Quicksilver Co. shows that during the year 8844 tons of ore were produced and roasted, yielding 99,000 pounds of quicksilver, .66% to the ton. The cost of production was 42%—about two-thirds of the product.

NEVADA COUNTY.

The Pennsylvania M. Co. and the Grass Valley Ex. Co. are each sinking a line of shafts, developing the apex lines of lodes the subject of the litigation now on in the U. S. Circuit Court of San Francisco. The work is part of the proof each party proposes to submit to the court.

A. P. Clarke, operating a placer mine at Quaker Hill, has had his mine closed down under an injunction issued out of the U. S. Court. The mine has been worked under a permit from the U. S. Debris Commissioners, and the provisions of the Act have been complied with.

A crushing of ten tons of ore from the Tilley mine, formerly the Midnight, at Nevada City, brought $30 per ton. Mr. Tilley is projecting a mill for the mine.

The Jenny Lind M. Co. of Grass Valley has bought eighty acres of the I. L. Weed ranch on Alta hill, the addition giving the company 6500 feet length of ledge.

The St. Johns mine, at Nevada City, has been bonded for eighteen months to Dr. C. W. Jones and P. P. Ferron, who state that a San Francisco company will develop the property.

At the Nevada City mine, now operated under bond by a party of local miners, a rich shoot of ore is reported to have been struck.

PLACER COUNTY.

The Bonnie Bee Q. M. & Dev. Co. has incorporated to mine near Emigrant Gap. H. A. Frost, of Dutch Flat, is secretary. The company propose to install a compressor plant.

A bedrock tunnel to open the channel in the Tadpole mine near Secret House has been started.

Wm. Muir, superintending the Sacramento mine at Forest Hill, says blue gravel has been struck that prospects 20 cents per pan.

PLUMAS COUNTY.

Standart & McGill have resumed work on their mine below Round valley.——The Upper Dutch hydraulic mine, La Porte, has been enjoined by the Anti-Debris Association. Between thirty and forty men have been thrown out of employment. The mine was operating under a permit from the Debris Commission.

SAN BENITO COUNTY.

The annual report of the New Idria quicksilver mine states that during the year 20,638 tons of ore were roasted, producing 3990 flasks of quicksilver; this sold for $140,828. Expenses were $117,994, including $19,172 for new construction and repairs and $10,240 for depreciation. The percentage of quicksilver recovered was a little less than ¾ of 1%.

SAN DIEGO COUNTY.

A new mining operation, in which Senators Morgan, Jones, Pettigrew and Dorcey are interested, is reported as preparing to put up a large gold mining plant at Picacho to mine low-grade gold ore. The milling plant is to be located on the west bank of the Colorado river, 5 miles from the mine. Surveyors are reported to be staking railroad lines from the mine to the mill site and from the latter to the railroad.

SHASTA COUNTY.

The smelting plant of the Mountain Copper Co. at Keswick is to be operated soon with electrical power. Manager L. T. Wright is reported to have contracted with the Keswick Electric Power Co., H. H. Noble of San Francisco president, for power for the entire plant. It is believed that 1500 H. P. will be necessary. The Keswick Electric Power Co. is installing a power plant on Mill Seat creek, in the Shingletown region, about 40 miles southeast of Redding. With the machinery now being taken in 6000 H. P. can be produced.

J. R. DeLamar has bonded the Globe group of copper claims near Copper City, within 3 miles of the Bully Hill plant, recently sold by him.

SIERRA COUNTY.

N. G. Read, of Downieville, has leased the Rising Sun mine and put men at work there.

The Sierra-Alaska G. M. Co. has incorporated to mine in Sierra county; capital stock, $50,000. J. H. Helms, A. J. Gilbert, H. Warren, W. J. Saulsbury, T. Holdsworth, of San Francisco, are directors.

TRINITY COUNTY.

The Texas Jack mine, near Trinity Center, T. F. Edmunds, owner, reports a thirty-day cleanup of $1500. The owner operates alone, having a 3-stamp mill at the mine.

TUOLUMNE COUNTY.

The Free Lance mine has been bonded by W. Sharwood, Sonora, who states that a company will be organized to resume its operations.

The Gold Brick mine, at Jamestown, owned by C. E. Dorgan, J. Mangante & Co., is being developed by a shaft, which has disclosed a shoot of ore believed to be a continuation of the Crystalline.

At the Jumper mine at Stent the shaft is down 1500 feet, stoping being done from the 700-foot level upwards.

A rich strike is reported in the Hope mine at Sonora. S. Ralston and Boston people are the owners.

The Clio mine at Jacksonville is closed down pending negotiations for a sale to C. D. Lane.

In the Dreisam mine, at Arastraville, the Yellow Jacket vein has been struck on the 400 level, 2 feet thick and high grade.

YUBA COUNTY.

A rich strike has been made on the 1600-foot level of the Victor mine (formerly the Dannenberg) at Browns Valley. It is said that $10,000 has been taken out of the pocket so far.

COLORADO.

BOULDER COUNTY.

H. M. Russell of California has organized a company, known as the Century Co., to operate the American mine at Magnolia on an extensive scale. Among the people interested are R. L. Spencer, J. F. Hackstaff of New York, G. L. Zimmerman of Harrisburg and F. B. Dunn of St. Johns, N. B.

The Leviathan M. Co. is operating eighteen claims near Ward. The group is being developed by a tunnel now in 720 feet toward the main vein, 500 feet farther in. The company is proposing to install a compressor and drills.

CLEAR CREEK COUNTY.

The Centurion G. M. Co. at Idaho Springs, under management of R. Prentice & Co. of Colorado Springs, is commencing work on eleven claims and mill site. A contract will be let to drive 1000 feet of tunnel.

GILPIN COUNTY.

The East Nodaway, operated by the Town Topic G. M. Co., is shipping considerable high-grade ore and doing development work. M. D. Draper is Supt.

Central City, April 22.

At the East Notaway mine, Central City, twenty-five men are working, subleasing or tributing. Some leasers have been taking out smelting ore running from seven to eleven ounces gold per ton, leaving them good wages after paying royalty to the Town Topics M. Co. The clearing and retimbering of the shaft is now completed, down 400 feet. M. D. Draper is Supt. of the Town Topics Co.

At the West Notaway, Central City, the 300, 350, 440 and 500 west levels are being worked. H. F. Pool is Supt. for the Notaway G. M. Co.

F. Belcher and W. Flagler of Central City have leased the Springdale lode, formerly owned by the Gold Rock M. Co., and have commenced work.

It is said Philadelphia people are to work the Rara Avis group, which has a mill site in Eureka district, near Central City, and $25,000 to $30,000 is to be spent in improvements.

The Carbonate King mine, 6 miles north of Ohio City, has exposed a large body of lead ore. The company expects to begin operations soon. The ore will be shipped or else treated by a concentrating plant to be erected by the company.

HINSDALE COUNTY.

The Hidden Treasure mine plant at Lake City is to be overhauled this spring. The mine is now producing 100 tons of ore daily from the 800-foot shaft, which is concentrated four into one and is then worth $50 a ton. The intention of the company is to substitute electricity for compressed air.

GUNNISON COUNTY.

S. T. Grant, president of the Cortland M. Co., Gold Brick district, says the mine has been making regular monthly shipments of about three carloads of high-grade ore, and will soon be able to ship about 100 tons. The ore shows ruby silver and black sulphurets running high in silver and wire silver and leaf silver in fracture planes. Mr. Grant says the Chloride mine, in the same district, is a shipper from the grass roots, several cars of rich ore having been shipped from the first 15 feet from the surface.

The Inez mine at Gunnison, owned by the Inez G. & S. M. Co., has been leased by J. C. Nyce and J. Peterson of Aspen. The workings are a 1100-foot tunnel and 260 feet of drift.

LAKE COUNTY.

It is stated that a rich strike has been made in the New Monarch at Leadville. A trainload of ore is said to have returned from thirty ounces upward in gold, 4% or 5% of copper, and 30% iron excess. The company has commenced paying dividends at the rate of $50,000 monthly, with only fourteen men employed.

Manager T. L. Davis of the Kubera M. Co. is working its leases on the Continental and G. M. Favorite claims. A contact 7 feet thick between the parting quartzite and white limestone was cut at 50 feet from the surface and the work is being done to develop it.

The Canterbury at Leadville is developing a solid body of manganiferous iron ore struck in the shaft. Assays from the top gave 33.1% iron, 19.2% manganese, and 8.5% silica, with a small amount of silver and lead.

Drifting has been resumed on the Rialto shaft, Leadville. Manager A. M. Gains says the condition at the mine is very encouraging since the water has been lowered.

SUMMIT COUNTY.

The hydraulic works of the Mecca Gold Placer Co. will be started again next month under L. Kingsbury's management. Last season's work was successful. Its record shows 28,000 yards of dirt handled, costing 7 cents per yard, and 24,000 yards, costing 2½ cents.

Breckenridge, April 23.

The Sarsfield mine, Montezuma district, has been sold to a Denver company, which proposes to commence work about May 15.——The Mosco mine, contiguous to the Silver King, started May 1 with a large force of men.

TELLER COUNTY.

It has been reported that the Portland at Cripple Creek is about to be bought by Warner Beit and that $4,500,000, 25% of the full purchase price, had been deposited in Denver.

The Vindicator Co., at Cripple Creek, report for the first quarter of the year shows 4325 tons of ore marketed, assay value $186,927.38. Freight and treatment amounted to $40,550.33, leaving gross proceeds $146,376.75. Operating expenses and payments to lessees amounted to $89,990.83, leaving as the net profit for quarter $56,439.92.

The ore shoot in 350-foot level of the Eclipse Con. Co., Cripple Creek, is 3 feet wide. Samples taken across the vein average $45 per ton. There is a narrow streak of high-grade ore. The company is upraising and when its extent of shoot is developed stoping will commence. The shoot is said not to have been opened in upper levels, so that from discovery there are 350 feet of ground above, and 70 feet below to the present lowest workings.

Cripple Creek mines during April paid $571,000 dividends.

The Gold Basin M. Co. has elected officers: E. J. McCarthy, president; R. S. Casey, secretary; J. F. Walsh, manager. The company has a lease on the Big Four. A new shaft is started and is expected to reach ore in 300 feet.

The Rigi at Victor has been leased by A. C. Dake of Denver for five years. Several thousand dollars is being expended in plant on the mine which has been closed down for a year.

The Star G. M. Co., leasing the Home Fraction, at Victor, is sinking the shaft to a depth of 300 feet. The 200-foot level has been run 85 feet on a 4-foot vein. J. F. Erisman is Supt.

The Chicago M. & L. Co. have incorporated to operate by leasing in Cripple Creek district. The capital is $500,000. The directors are M. Wolforth, A. Junge, J. H. White, W. W. Wernott and L. A. Reynolds.

The Copper Signal G. M. Co. at Cripple Creek has increased its capital stock from $1,250,000 to $1,500,000.

It is reported that two veins opened in the drift run from the 1000-foot level of the Portland at 500 feet from the shaft joined, and assays taken run from $45 to $110 per ton, the average being something like five ounces. The vein is 5 feet wide and is said to be all ore.

The Eclipse Con. Co., at Cripple Creek, has struck a 4-inch streak of ore in an upraise from the 250-foot level, showing sylvanite in large masses. Besides this streak is a 4-foot body of ore that averages between $30 and $40 to the ton.

Allen & Co., leasing the main block of the Pharmacist, have cut a shoot which they believe was hitherto unknown. At a depth of 170 feet they drifted 10 feet east of the shaft and cut a vein trending about north and south. On this they had drifted but a few feet when an ore body was exposed that measures 4 feet and runs $60 a ton throughout without screening or sorting.

IDAHO.

ELMORE COUNTY.

H. T. Wright has bonded the Last

Chance mine and hoist and the Brick Pomeroy claim adjoining, near Atlanta, at $15,000—$500 cash and the balance before Nov. 1, 1901.

KOOTENAI COUNTY.

Many claims have been taken up in the new St. Maries placer field east of Tekoa; but the prospecting has not developed any paying claims beside the discovery.

LATAH COUNTY.

The cyanide plant and stamp mill to be built by the Jericho M. Co. near Elk City is to be of twenty-five tons capacity, and it is expected that the mill will be running by July 1. Besides two shafts, several tunnels have been run and a great deal of stoping ground opened up. A hoist and pumps will not be bought until the mill is running; C. Schill, Kendrick, is manager.

NEZ PERCES COUNTY.

R. N. Graves, director of the Alamance Co., mining at Elk City, is superintending the reconstruction of the mill which was burned in March. The new mill will have a capacity of twenty-five tons daily and is expected to be working by July 1st.

SHOSHONE COUNTY.

The Frisco mine is closed down indefinitely, owing, it is said, to the unsatisfactory lead market and the desire of the owners to make needed repairs on the flume and shaft. The Frisco employs about 300 men.

The Chloride Queen M. & M. Co. at Wallace has begun a tunnel to cut 400 feet below the old workings.

WASHINGTON COUNTY.

A smelting plant at Weiser is said to be assured, awaiting the selection of a proper site on which to erect a large plant. The purpose is to build immediately a plant of 100 tons capacity, ultimately to enlarge to 1000 tons capacity per day. A. Eoff of Boise and others are interested.

It is reported that crosscutting and drifting is being done on the third level of Finch & Campbell's Ajax mine, at Dixie, for the purpose of determining whether the ore body is continuous, and if it is, that a 40-stamp mill will be put on the property at once.

MONTANA.

CASCADE COUNTY.

In the Sweet Grass hills an iron deposit is being developed. The ore body is from 50 to 80 feet wide, carries some percentage of copper and being a fluxing ore will be in demand by smelters.

The Blaine's Peak G. M. & M. Co. has incorporated to mine in Oregon, Montana and elsewhere. Capital is $2880 and Great Falls the principal office.

LEWIS AND CLARKE COUNTY.

The Bimetallic at Washington Bar, F. Herdt manager, propose to build a mill near the mine this summer.

The Viola Jane group, near Helena, has been bonded by C. H. Rosman of Broadwater county at $20,000. The property is developed by an incline shaft 110 feet deep. A force of men is working developing the property.

MADISON COUNTY.

The Big Show G., S., C. & I. M. Co. has been incorporated in Wheeling, W. Va, capital $1,500,000, to work the Big Show, Iron Mask and Quartz Wonder mines. The incorporators are C. E. Lentz of Twin Bridges, Mont., H. F. Smith, J. B. Wolfe, E. Wagner, R. M. Shearer, J. J. Cushing.

Field & Morris have shipped a car of $200 ore from Clipper tunnels 4 and 5 at Pony.——L. Tarbot has sold his half interest in the Bessie O'Brien lode to F. Meyers and R. T. Smith for $2500.——The Red Bluff mine, at Red Bluff, will start up again in about six weeks.

MEAGHER COUNTY.

The Bob Evans C. M. Co. has incorporated in West Virginia, with principal office at Toledo, Ohio, to mine in Meagher county, Montana.

PARK COUNTY.

C. Werngreen and associates have bonded the Bear Gulch M. Co.'s property for nearly $2,000,000. The foreign syndicate expect to close the deal and to proceed to equip the property with a large modern treatment plant.

SILVER BOW COUNTY.

It is reported that the Butte Miners' Union has invested $50,000 in Amalgamated C. Co. stock. The investment gives every miner in Butte district a personal interest in the mines. It is stated that 8% has been guaranteed on the investment and the full price of the stock in case it wishes to sell after one year.

Two-thirds of the stock of the Boston & Montana and Butte & Boston Cos. is reported to have assented to the consolidation with the Amalgamated Copper Co. Steps have been taken to prevent the consolidation and a temporary injunction has been granted in New Jersey, restraining the Amalgamated C. Co. from purchasing control until the full terms upon which the deal will be made are fully disclosed to the stockholders.

T. T. Hoffman has made a strike in the West Olive Branch, near Butte. The assays are said to show $64.80 in silver and 4% copper to the ton.

NEVADA.

ELKO COUNTY.

Developments made in the lignite deposits near Elko consist of a shaft 60 feet deep with a 100-foot incline at a pitch of 20° on the vein, showing 40 inches solid coal and a 50-foot drift, which shows 33 inches of good quality coal. A partial analysis is said to show 46% fixed carbon, 47.1% volatile, 3.5% ash.

ESMERALDA COUNTY.

The Mascot gold mine, in Hawthorne district, has been sold by Summerfield & Bauer to the Hawthorne G. M. Co. of Boston, Mass., who will soon begin development on the claims. S. M. Summerfield of Hawthorne, Nevada, is manager.

HUMBOLDT COUNTY.

A San Francisco syndicate has engaged Prof. E. E. Smith of Stanford University, Cal., to make an examination of the niter beds in the vicinity of Lovelocks.

LINCOLN COUNTY.

The State Line Metal Co. has incorporated in Iowa, capital $50,000, to mine in Yellow Pine district, near Pioche.

M. W. Conkling of Los Angeles, Cal., has bonded the Potosi mine at Pioche and has let a contract to J. Metcalf and J. La Cyr to run 100 feet of tunnel.——In the Green Monster mine silver ore has been struck in the 180-foot level, carrying over seventy ounces silver and 10% copper.

STOREY COUNTY.

It is reported that Charles Butters has bought the dumps of the Union Con. M. Co. at Virginia City and will erect a mill there to treat them.

WHITE PINE COUNTY.

D. C. McDonald, W. Rynearson and C. S. Lamphear, owners of the Valhalla mine, near Robust, are taking from a shaft 27 feet deep ore that goes 60% lead, 34 ounces in silver and $1.50 in gold.

WASHOE COUNTY.

The Great Western Co. is sinking its shaft at Steamboat Springs 2 feet a day and expect to cut the vein shortly.

NEW MEXICO.

GRANT COUNTY.

The Pinos Altos G. M. Co. is drifting on the 900-foot level. Over 100 tons of ore are taken out daily and treated at the company's mill, the concentrates going to a smelter. The present capacity of the mill is to be doubled and the water supply increased in the near future.

OREGON.

BAKER COUNTY.

The townsite of Sumpter is believed to be on the channel of an old bearing stream. Miners sinking to bedrock have found good pay and are preparing under contract with the owners of the townsite to work extensively by drifting.——It is reported that E. H. Hackett, managing owner Tom Paine mine, Baker City, will begin work on that property at once.

At the Keystone-Belle mine, Baker City, development continues and the tunnel is now in over 800 feet; J. W. Bolland is manager.——It is reported that at 980 feet in the tunnel of the Little Giant mine, Baker City, the main ledge was cut and found very rich. The Little Giant M. Co. is the owner of this mine.

The Homestake mine, in the Burnt River district, reports a rich strike. It is owned by the Great Western P. & D. Co. of Salt Lake City, Utah. It has a ledge of free-milling, low-grade gold ore.

Ore from the Mammoth mine is treated at the Virtue mill. The former is owned by J. H. Parker, L. Sommer, I. Baer and J. Wilson of Baker City.

The owners of the Pomeroy dredger, operating on Snake river, near Weatherby, are considering the erection of another dredger of larger size, and have recently secured bonds on rich river bottom in Grant county.

JOSEPHINE COUNTY.

The Mountain Lion mill, situated in Missouri Flat district, has been started and is crushing ore from the vein recently discovered.

W. P. Gilkeson and J. Lewis of Seattle bought J. W. Thomasson's quartz claims, near Placer. Men have been put to work on the mine, which so far as developed shows a 2-foot vein of good ore.

It is reported that a rich strike has been made in the Roaring Gimlet mine, owned by Houck & Mitchell, at Gold Hill. The property is being worked under a bond by parties who, it is said, have already taken out several thousand dollars.

UTAH.

DAVIS COUNTY.

The Consolidated M. & M. Co. has incorporated, capital $37,500. Albem Allen is president, N. H. Ives secretary and treasurer, Ogden. The company proposes to develop claims in Weber mining district.

GRAND COUNTY.

The Green River Oil Co. has incorporated with capital at $250,000 to work the Romney and other oil claims. J. H. Moyle is president and F. C. Bassett secretary and treasurer, Salt Lake City.

The National C. M. Co. has incorporated to mine the National and other claims on Onion creek. I. E. Smith is president; C. E. Peyton, secretary and treasurer, Salt Lake City.

JUAB COUNTY.

Dr. Franklin and J. DuBois of Salt Lake City are considering the future development of the Mountain View, at Eureka, in which they are interested. Power will probably be furnished by the Yankee when the plant is installed.

SALT LAKE COUNTY.

President S. McIntyre of the Mammoth refused to extend the time for the acceptance of the option held by the Bingham C. & G. M. Co. on the mine and it will not be bought by the latter company.

Col. E. A. Wall has taken an option on the Jay Gould 1 and 2 claims at Bingham, making a payment of $1000 down, balance of $14,000 by April 23, 1902.

The Bingham Con. M. & S. Co. has been incorporated in Maine, capital $10,000,000, to absorb the Bingham and adjacent properties. The stockholders of the Bingham C. & G. M. Co. are to receive $5,000,000 of this in stock in exchange for their stock, and $2,000,000 of the stock is to pay for the Dalton & Lark and other claims and purchase of the Copper Belt R. R. from the Rio Grande Western track to the mine. The treasury is to be provided with $1,000,000 cash and $2,000,000 of stock are to remain in the treasury. The Mammoth and Grand Central are not included.

The Yampa group at Bingham is reported working in a new development made in the main shaft. In sinking, after the stratum of gold-bearing ore, at 90 feet depth the sulphides were entered for 40 feet in solid ore; an average sample is said to have assayed from the bottom 10% copper, sixty ounces silver and $6 gold per ton.

During six months ended December 31, 1900, the smelter of the Utah Con. treated 40,103 tons sulphide copper ore, which produced 1199.81 tons fine copper, 48,869.52 ounces fine silver and 4341.563 ounces gold.

UTAH COUNTY.

The Tintic Con. M. Co. has incorporated, capital $5000, to mine the Sister May group in Silver Lake district. O. Hudson is president, C. B. Jack treasurer and secretary, Salt Lake City.

SOUTH DAKOTA.

LAWRENCE COUNTY.

The Clara Bell M. Co. has been incorporated to work the Clara Bell mine. F. Hebert is president, C. Hebert secretary. A new shaft is to be sunk and concentrators are to be added to the stamp mill.

PENNINGTON COUNTY.

The Imperial M. Co. expects to begin work on their 100-ton cyanide plant at Deadwood in May.——The Hidden Fortune M. Co. propose to put in a 200-ton plant at Belle Fourche.——The cyanide plant of the Homestake mine, to treat 1200 tons daily, has started operations.

WASHINGTON.

FERRY COUNTY.

The main Wauconda ledge has been cut, the big vein recently passed through proving to be a blind lead. The average samples of 7 feet showed a value of $13.20. A picked sample assayed $49 per ton. The ledge is being cut almost 600 feet below the surface.

STEVENS COUNTY.

C. C. Knutson, owner of the Great Republic, near Northport, is reported to have interested capitalists to work the property with machinery. The ore is gold-copper, of a rather refractory nature.

WYOMING.

UINTA COUNTY.

H. A. Titcomb, Asst. manager of the Carissa mine, at South Pass, says extensive ore bodies have been developed on the lower level of that mine.

The Copper King, near South Pass, is being developed by Harsh & Vosburgh.

FOREIGN.

BRITISH COLUMBIA.

J. B. Hobson of the Cariboo Con. H. mine at Bullion verifies the statement that the first clean-up this season will be exhibited at Glasgow. A blast of 175,000 pounds of black powder will be exploded at the mine, breaking down 2,000,000 cubic yards of pay dirt for sluicing.

Work has started on the concentrator at the Enterprise mine, near Nelson, owned by the London & British Columbia Gold Fields. The contract, which includes a compressor plant, has been let to G. McFarlane of Nelson. It is expected that the concentrator will be in operation by September.

The St. Keverne Mines, Ltd., have incorporated to work the Keverne group at Slocan. J. A. Finch of Montreal is president. There will be a considerable sum expended in development.

It is reported from Spokane that a smelter will be built this summer at Midway by J. Breen, to treat ore from the Dominion Copper Co. mines.——At the Nettie L. at Lardeau a new fan and water wheel will be installed in the lower workings. The company is considering the installing of machinery in the mine and a concentrator in Ferguson, with an aerial tramway connecting the two.

On the Green Mountain, Rossland, prospecting with a diamond drill has discovered a ledge over 100 feet wide. The ore runs from $8 to $10 per ton and can be concentrated. The company will develop it and erect a concentrator.

The Golden Monarch M. & M. Co. of Spokane, Wash., operating in the Foghorn at Ymir, has cut 200 feet from the mouth of the tunnel, a blind vein showing 12 inches of good ore.——A. W. Boyd, manager of the Canadian King at Erie, states that men have been put to work on this property, and that when the snow goes, the company intends to install a compressor and other machinery.

W. S. Rogers and C. Geit of Spokane, Wash., interested in the Iron Horse at Slocan, have been visiting that property. It is said the bond is to be taken up and hoisting machinery will be installed.——Work has been restarted on the Ottawa, at Slocan, recently bonded by J. M. Williams for English people.

The London Con. and Richelieu Cos., which own the Silver Hill, near Nelson, will contract shortly for the construction of a tramway 10,000 feet from the mine to the wagon roads.

A second smelter is said to be assured at Grand Forks. C. R. Tuttle, manager American M. I. Co. of Minneapolis, and some Duluth capitalists have proposed to build a 1000-ton smelter if a site could be had and contracts from mine owners for ore could be secured. The Board of Trade of Grand Forks has promised the smelter site, and mine owners present guaranteed sufficient ore to start operations.

Work on the Wreck Bay placers on the west coast of Vancouver island, suspended during the winter, has started up and gold is being taken out from black sand at the rate of $400 a day, with two washing machines.

JAPAN.

Gold has been known and mined in a small way in Yeso, the northernmost of the Japan islands, for many years. The general activity elsewhere has stimulated prospecting and new and larger discoveries are being made. The climatic conditions are somewhat similar to those of southeastern Alaska. Rain is excessive and the mining ground is covered with moss and other vegetation. It is at present only a gold field for Japanese.

MEXICO.

The Minas Prietas Reduction Syndicate, M. P. Perry manager, Torres, Sonora, working tailings from Grand Central mill at La Colorada, is increasing the plant by adding a slimes wheel, a large dynamo and other machinery. They now separate the copper from their product and sell copper sulphate to mining companies for use in their mills. The plant treated 10,464 tons of tailings in March.

J. L. Green has bonded three mines at Galiban, Sonora, and proposes to begin work upon them at once. They are old mines formerly extensively worked.

NEW ZEALAND.

The dividends paid by dredging companies during 1900 were £100,211, from twenty-eight companies, having £202,652 paid up capital—about 50% per annum on capital. Seventeen other dredging companies at work, with £125,000 paid up capital, have not so far paid any dividends. The return on total paid-up capital of these forty-five dredging companies was at the rate of 31% per annum. The total gold yield of dredging for 1900 is 62,275 ounces, value estimated at £239,750.

PARAGUAY.

J. H. Wall of Sydney, Australia, has recently prospected the Rio D'Oro at the Matto Grosso gold diggings in the interior of Paraguay. The results of the prospecting are said to be satisfactory and the Transpacific Exploration Syndicate

has been formed in Sydney to work by dredging 32 miles of river bed in a concession obtained by Mr. Wall.

RHODESIA.

The Globe & Phœnix G. M. Co. started running their mill on August 5th last. The ore milled in 123 days was 30,544 tons, gold production 24,778 ounces, average extraction $16.85 per ton, and average value of tailings $4.73 per ton. The width of the ledges mined is 20 inches and 30 inches.

Personal.

J. B. JENSON of Salt Lake City, Utah, is in Mexico.

C. D. HAZZARD of Quincy, Cal., is in San Francisco.

JAMES H. KINKEAD, of Virginia City, is in San Francisco.

R. BUCK, M. E., of Dawson, Yukon Ter., is in San Francisco.

GEORGE W. STARR, Supt. Empire mine, Grass Valley, Cal., is in San Francisco.

A. LAIDLAW has resigned as manager Standard Pyritic Smelter, at Greenwood, B. C.

D. KANE of Salt Lake City, Utah, is in charge of the St. Peters mine, Grants Pass, Or.

HON. J. T. DAVIS, Pres. Sweepstake Hy. mine, Weaverville, Cal., is visiting in San Francisco.

G. KISLINGBURY of San Francisco is in Colorado examining a mining proposition for Capt. DeLamar.

W. G. DOUGLAS, Supt. Gould & Curry mine, Virginia City, Nev., has returned there from San Francisco.

J. T. FINLEN, who has been in Grass Valley, Cal., for Senator Clark's syndicate, has returned to Montana.

SOLON SPIRO, manager Lucky Bill and Little Bell groups, Park City, Utah, has returned there from New York.

VICTOR BARND, manager Tybo M. & R. Co., at Tybo, Nev., has returned to that place from a visit to New York.

J. B. HOBSON, manager Cariboo Con. Hy. G. M. Co., has gone to Bullion, B. C., to start the mine up for the season's run.

BENJ. OPIE, Supt. Pennsylvania mine, Grass Valley, Cal., has been in San Francisco in connection with the litigation of his company.

JOHN TRUSCOTT, formerly Supt. Oneida mine, Sutter Creek, Cal., has accepted the superintendency of the Bunker Hill mine, near Amador City, Cal.

GEO. ICARD, formerly of Rough and Ready, Nevada Co., Cal., is gold mining in Benguet Province, Philippine islands, with, it is said, very good results.

I. M. KENNELLY, who has been superintending for several months the development of mining properties for the late R. C. Chambers, has returned to Salt Lake City, Utah.

WM. MAGENAU, formerly engineer for the Columbia Lead Co., of Esther, Mo., has recently returned from Mexico and is now superintendent of the Catherine Lead Co., Frederickstown, Mo.

Books Received.

The U. S. Geological Survey has issued a diagram and tables showing the production of the several anthracite coal fields in Pennsylvania since 1820, together with a map showing their location. The graphic method employed enables the reader to get a comprehensive grasp of a very great industry with comparatively little mental labor.

"Gold Milling, Principles and Practice," by C. G. Warnford Lock, published by E. & F. N. Spon, Ltd., 125 Strand, London, and Spon & Chamberlain, 12 Courtland St., New York, 823 pages, 8vo. The work is by far the most elaborate dealing with the special subject that has ever been published. Its limitation of discussion to what is gold milling practice today and its development of the commercial side of the subject are features that can not be too highly commended. Higher mathematics in mechanics and chemistry are not forced to the front, but principles which are their conclusions are expressed in simple, intelligible language. Designed, as the author says, to serve the everyday practice of the mill manager and his workmen, the book is valuable to the student of mining and metallurgy. The mass of statistical information reduced to common terms will save him much of the purely physical labor connected with the acquisition of knowledge of the subject. This feature of the work could have been improved for American use by giving costs in dollars and cents, as well as in English money units. The book is a valuable contribution to the text-books of a special literature heretofore scantily supplied. Price $10.

Commercial Paragraphs.

THE Colorado Lamp Co., 2051 California St., Denver, Colo., has recently received a large order from the Government of New Zealand.

JAMES C. H. FERGUSON, Pacific coast sales agent for the Midvale Steel Co. of Philadelphia, has established offices at 123 California St., San Francisco.

THE Denver & Rio Grande R. R. passenger department is getting out a finely illustrated and descriptive book relative to points and sections through which their lines pass.

THE Hoff Asbestos Mfg. Co. of San Francisco and Los Angeles, Cal., report that their asbestos air cell sectional steam pipe covering has been adopted by the S. F. Gas & Electric Co. after a test on the steam plant of the Palace Hotel at San Francisco.

CRANE CO., Chicago, manufacturers of valves, fittings, etc., will erect this summer a modern fireproof building exclusively for its offices. It will be about 90 feet by 100 feet, five stories and basement, and will be located adjacent to its large manufacturing works at Canal and Twelfth streets.

THE Pacific Commercial Museum at San Francisco, Cal., is preparing an exhibit and gathering information to develop and facilitate trade with the Philippine Islands. The museum now has an agent at Manila, to whom instructions have been sent to report on the articles now marketable, their sale prices and such other information as shall give merchants and manufacturers the fullest possible information.

THE Keystone Driller Co. of Beaver Falls, Pa., are making extensive additions to their manufacturing plant. They have bought additional land and will put up three new buildings and additional machinery. They expect to increase their present output of drilling tools and supplies 400% to meet the increasing demand. They announce that they are in the market for timber and roofing slate.

THE U. S. Treasury Department, by O. P. Austin, Chief of the Bureau of Statistics, is advocating a floating exposition to carry samples of our manufactures to foreign countries. German merchants and manufacturers have had successful experience with this aid to advertising and there is no reason why our people should not. The suggestion is worth the consideration of the manufacturers of mining tools and appliances, particularly with reference to supplying the trade in eastern Asia and the islands. This field has been held by German manufacturers.

Notices of Recent Patents.

Among the patents recently obtained through Dewey, Strong & Co.'s SCIENTIFIC PRESS U. S. and Foreign Patent Agency, the following are worthy of special mention:

LOCKS.—No. 672,594. Dated April 23, 1901. P. V. Cornils, Seattle, Wash.

This invention relates to improvements in locks of that class known as "mortise locks." It consists essentially of a knob spindle normally rotatable to operate the latch mechanism; a lock plate at one face of the door stile exterior to the lock; devices carried by the spindle movable into and out of engagement with the locking plate to secure the spindle against rotation when engagad, and means independently operating from each end of the spindle for moving the locking devices out of engagement with the lock plate and releasing the spindle.

PIPE COUPLING.—No. 672,598. Dated April 23, 1901. W. F. Drew, Sacramento, Cal.

The object of this invention is to unite pipes at any angle at which they may meet, and to form tight joints at such angles or any change thereof as may afterwards be made. The pipe sections have the adjacent ends reversely curved so that the meeting ends of the pipes stand axially in line. A globular segment formed upon one of said ends, and a corresponding concavity upon the other into which the convex portion fits, with a clamping nut, operates to secure the parts together and allow them to be adjusted before locking.

DISK HARROWS.—No. 672,485. Dated April 23, 1901. J. Lindstrom, San Jose, Cal., three-quarters assigned to Farmers' Union, same place.

In this invention gangs of disks are mounted on standards depending from pivotally mounted horizontally turnable bars, and draft rods extend upwardly and forwardly from the lower part of the standard. Levers are pivotally secured between their ends having opposite ends connecting with the draft rods. The slidable crosshead between the gangs and connections between the crossheads and the inner ends of the levers serve to simultaneously turn the gangs with relation to each other.

EXPANSIBLE PACKING ATTACHMENT FOR ARTESIAN WELLS.—No. 672,475. Dated April 23, 1901, F. Cavallaro, San Jose, Cal.

Within the casing of the well and between it and the suction pipe is an annular bag encircling the pipe having a reinforce bottom and expansible sides. Pipes enter the bag and adjustably suspend it at any depth below the surface. These pipes are adapted to transmit a fluid pressure to the bag to distend the sides and form a tight seal between the suction pipe and the casing. When water is being pumped a vacuum is formed below this packing bag and the air pressure thus produced in the surrounding strata causes an increased flow of water into the well.

WELL-DRILLING ATTACHMENT.—No. 672,470. Dated April 23, 1901. E. D. Wolbert, Bakersfield, Cal.

This invention relates to well-boring drills, sand pumps and like apparatus, and its object is to provide a means for slowly raising the drill or other part and then allowing it to drop more suddenly so as to penetrate the material through which it is passing, and when used in conjunction with a sand pump the sudden dropping of the pump causes it to agitate and stir up the material and thus fill the pump bucket. It consists of a fulcrumed lever, a pulley carried at the outer end, over which the drill rope passes, a revoluble cam, a slide movable upon the pulley carrying lever which is engaged by the cam, and means fulcruming the slide adjacent to the lever so that the latter is moved about its fulcrum, and the outer end caused to travel at different rates of speed. In conjunction with this is a latching device whereby the lever and pulley may be retained out of contact with the cam when desired.

List of U. S. Patents for Pacific Coast Inventors.

REPORTED BY DEWEY, STRONG & CO., PIONEER PATENT SOLICITORS FOR PACIFIC COAST.

FOR WEEK ENDING APRIL 23, 1901.

672,691.—SAW SHARPENER—G. Y. Anderson, Dyea, Alaska.
672,662.—DESK TELEPHONE—A. K. Adriano, S. F.
672,816.—HAIR FASTENER—Lottie Bassett, Cedarville, Cal.
672,438.—TRICYCLE—F. E. Black, Bellemont, Ariz.
672,869.—BOLT CUTTER—S. S. Bolsinger, Brockway, Or.
672,475.—ARTESIAN WELL PACKING—F. Cavallaro, San Jose, Cal.
672,494.—LOCK—P. V. Cornils, Seattle, Wash.
672,598 —PIPE COUPLING—W. F. Drew, Sacramento, Cal.
672,524. — AMALGAMATOR — Ghiglieri & Schofield, Stockton, Cal.
672,485.—DISK HARROW—J. Lindstrom, San Jose, Cal.
672,737.—WRENCH—Mahana & Pompe, Toledo, Wash.
672,739. — AMALGAMATOR — L. Mayhew, New Whatcom, Wash.
672,740. — AMALGAMATOR — L. Mayhew, New Whatcom, Wash.
672,453.—FRUIT GRADER—S. McGarvin, Fresno, Cal.
672,801.—LOOMS—J. H. Northrop, Tustin, Cal.
672,537.—PUMP—C. L. Parker, Los Angeles, Cal.
672,517.—SAW SET—J. Wesely, Scio, Or.
672,470.—WELL DRILL—E. D. Wolbert, Bakersfield, Cal.
672,518.—MAIL BOX—W. D. Wright, Saticoy, Cal.

Recently Declared Mining Dividends.

	Payable.
Alaska-Treadwell M. Co., Alaska, quarterly, 37½ cents per share	April 29
Town Topics M. Co., Colorado, ½ cent per share	May 1
Adams M. Co., Colorado, 5 cents per share, $7500	April 25
Standard Con. G. M. Co., California, quarterly 10 cents per share	May 21
Quicksilver M. Co., California, 2%, $21,500	May 10
Bunker Hill & Sullivan M. & Con. Co., $21,000	May 4
Utah M. Co., Utah, 2 cents per share, $2000	April 27

Latest Market Reports.

SAN FRANCISCO, May 2, 1901.

SILVER—Per oz., Troy: London, 27⅝d (standard ounce, 925 fine); New York, bar silver, 59½c (1000 fine); San Francisco, 59½c; Mexican dollars, 50c San Francisco, 48½c New York.

COPPER.—New York: Lake, 1 to 3 casks, $17.25; carload lots, $17.00; Electrolytic, 1 to 3 casks, $16.75; carload lots, $16.62½; Casting, 1 to 3 casks, $16.75; carload lots, 16.62½. San Francisco: 18. Mill copper plates, 20c; bars, 22@23c. London: £70 7s 6d per ton.

LEAD.—New York, $4.42½; Salt Lake City, $4.00; St. Louis, $4.32½; San Francisco $4.90, carload lots; 5½c 1000 to 4000 lbs.; pipe 6, sheet 6½, bar 5½c; pig, $5.25. London, £12 3s 6d per ton=2.73½ cents per ℔.

SPELTER. — New York, $4.20; St. Louis, $3.75; London, £16 2s 6d per ton =3.58½ cts. per ℔; San Francisco, ton lots, 5½c; 100-lb lots, 6c.

ANTIMONY.—New York, Cookson's, 10c; Hallett's, 9c; San Francisco, 1000-lb lots, 12c; 300 to 500 lbs., 13@14c; 100-lb lots, 15@18c.

IRON.—Pittsburg, Bessemer pig, $17.25; gray forge, $16.50; San Francisco, bar, per lb., 2.65c in small quantities.

STEEL.—Bessemer billets, Pittsburg, $24; open hearth billets, $27.00; San Francisco, bar, 7c to 12c per lb.

TIN.—New York, pig, $26.00; San Francisco, ton lots, 28c; 1000 ℔s., 28½c; 500 ℔s., 28½c; less, 29c; bar tin, ℔ ℔, 32½c.

QUICKSILVER. — New York, $51.00 large lots; London, £9 2s 6d; San Francisco, local, $47.00 ℔ flask of 76½ ℔s.; Export, $45.00

MAGNESIUM.—New York, $2.90 ℔ ℔.; San Francisco, $3.75.

ZINC.—San Francisco, 5½c; slab, 5¾c; bar, 7c; zinc dust, N. Y., 8c.

BABBITT METAL.— San Francisco, No. 1, 10c.

SOLDER. — Half-and-half, 100-℔. lots, 18c; San Francisco, Plumbers', 100-℔. lots, 15c.

PHOSPHORUS. — F. o. b. New York 50@60c ℔ ℔.

ASSAY LITHARGE.—San Francisco, 10c ℔ ℔, small lots.

BISMUTH.—New York, ℔ ℔., $2.25 50-℔ lots; San Francisco, $2.50 to $2.75 ℔ lots.

FERRO-MANGANESE. — Pittsburg, 80%, domestic, $62.50, large lots.

TUNGSTEN.—New York, ℔ ℔., 95c; San Francisco, $1.15.

FERRO-TUNGSTEN. — New York, 37%, 32c; San Francisco, 65c (60%).

NICKEL.—New York, 50@60c ℔ ℔.

PLATINUM.—San Francisco, crude, $22 ℔ oz.; New York, $22 per Troy oz

ALUMINUM.—New York, No. 1, 99% pure ingots, 35c; No. 2, 90%, 30c to 35c.

POWDER.—F. o. b. San Francisco: No. 1. 70% nitro-glycerine, per ℔., in carload lots, 15½c; less than one ton, 17½c. No. 1*, 60%, carload lots, 13½c; less than one ton, 15½c. No. 1** 50%, carload lots, 11¾c; less than one ton, 13½c. No. 2, 40%, carload lots, 10c; less than one ton, 12c. No. 2* 35%, carload lots, 9½c; less than one ton, 11½c. No. 2** 30% carload lots, 9c; less than one ton, 11c. Black blasting powder in carload lots, minimum car 728 kegs, $1.50 per keg; less car lots, $2 per keg.

CAPS.—3x, $5.50 per 1000; 4x, $6.50; 5x, $8; Lion, $9, in lots not less than 1000.

FUSE.—Triple tape, $3.60 per 1000 feet; double tape, $3.00; single tape, $2.65; Hemp, $2.10; Cement No. 2, $3.00; Cement No. 1, $2.65, in lots of 3000 feet and up.

CANDLES.—Granite 6s, 16 oz., 40s., 10¾c ℔ set; 14 oz., 40s., 9¾c.

CHEMICALS.—Cyanide of potassium, 98%–99%, jobbing, 32½@33½c ℔ ℔.; carloads, 30@31c; in 10-℔. tins, 40c; sulphuric acid, in carboys, 66% B, 2c ℔ ℔.; soda ash, $1.90 ℔ 100 ℔s. 58%; hyposulphite of soda, 2¼@3c ℔ ℔.; blue vitriol, 5¾@6½c ℔ ℔.; borax, concentrated, 7@8c ℔ ℔.; chlorate of potash, 12@13c; roll sulphur, 6c; alum, $1.90@2.00; flour sulphur, French, 2½@ 2¾c; California refined, 1¾ @ 2c; nitric acid, in carboys, 8c ℔ ℔.; caustic soda, in drums, 3@4c ℔ ℔.; Cal. s. soda, bbls., $1.00; sks, 95c ℔ 100 ℔s.; chloride of lime, spot, $2.50@2.60; nitrate of potash, in kegs, 8c; caustic potash, 10c in 40-℔. tins.

OILS.—Linseed, pure, boiled, bbl., 75c; cs., 80c; raw, bbl., 73c; cs., 78c. Deodorized Stove Gasoline, bulk, 14½c; do., cs., 20½c; 86° Gasoline, bulk, 20c; do., cs., 26c; 63° Naphtha or Benzine, deodorized, in bulk, per gal., 13½c; do., in cs., 19½c; Lard Oil, Extra Winter Strained, bbl., 75c; cs., 80c; No. 1 bbl., 50c; cs., 55c. Neatsfoot Oil, coopers' bbls., 60c; cs., 65c; No. 1 bbl., 50@52½c; cs., 55@57½c.

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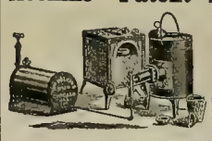

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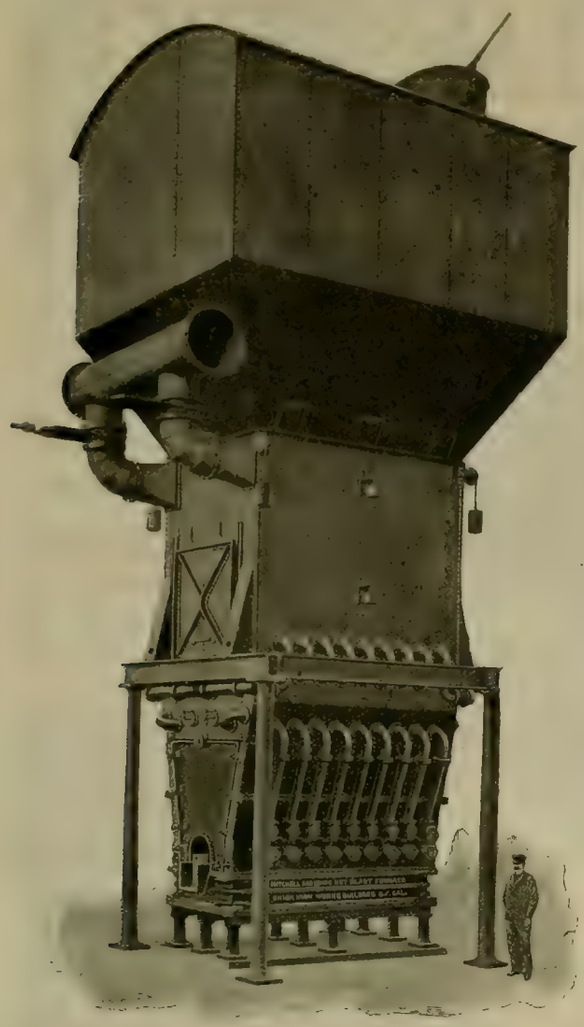

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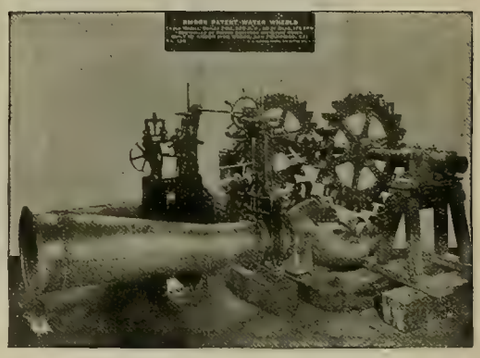

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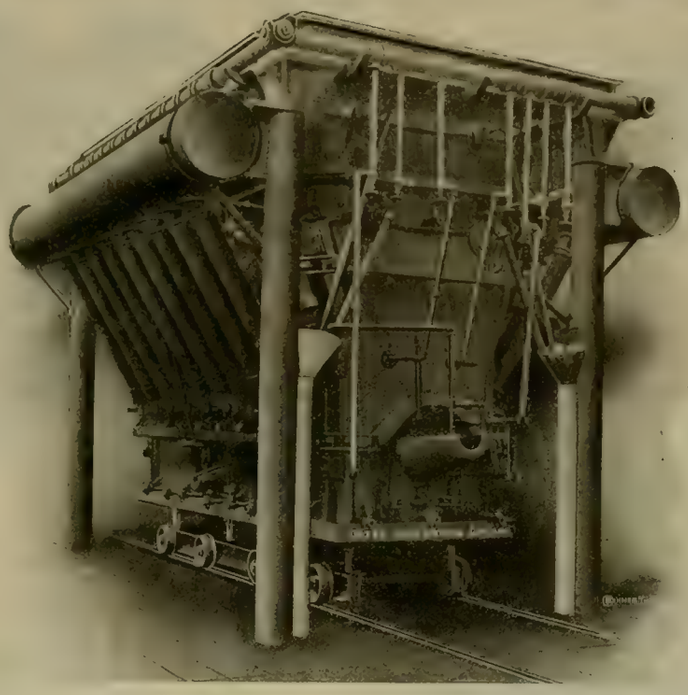

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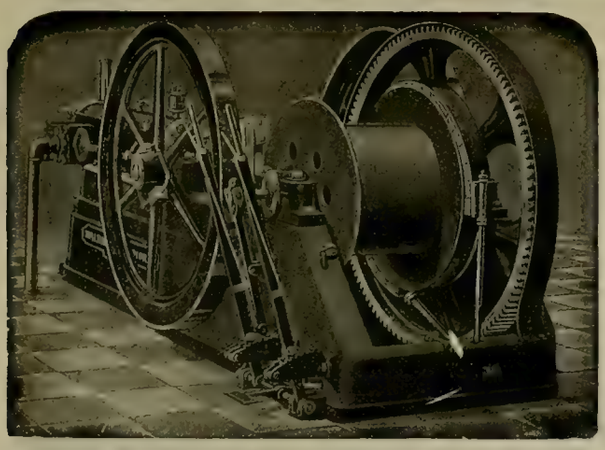

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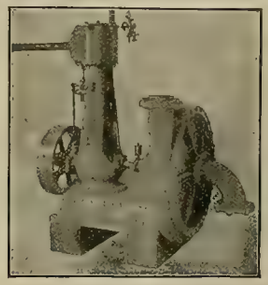

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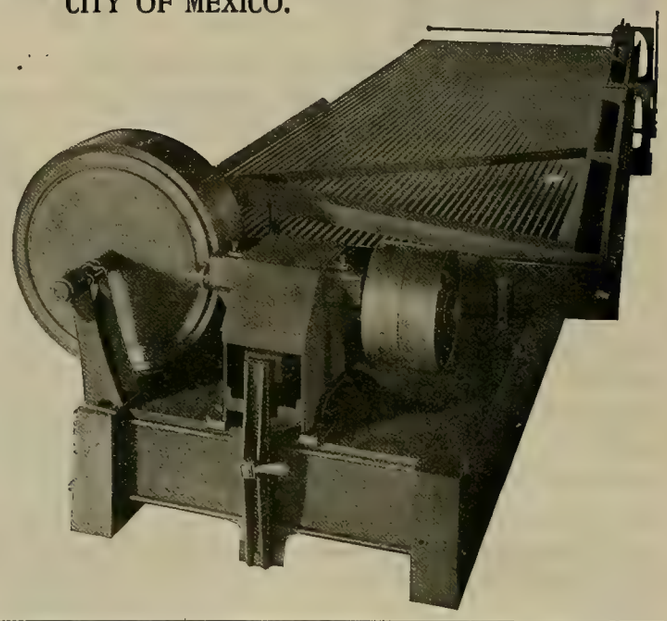

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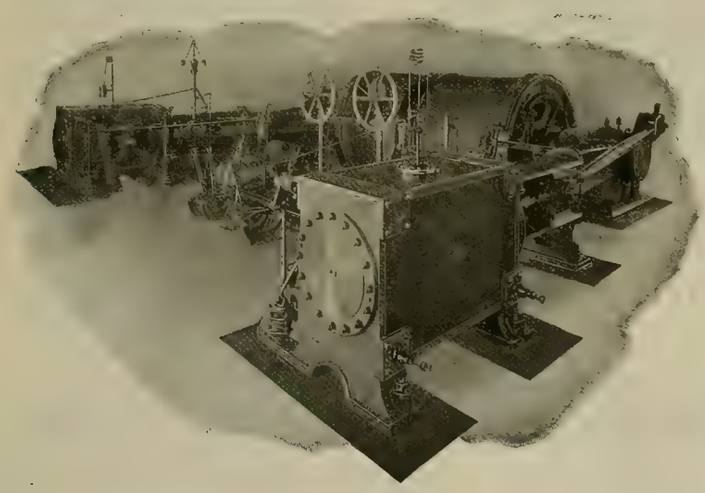

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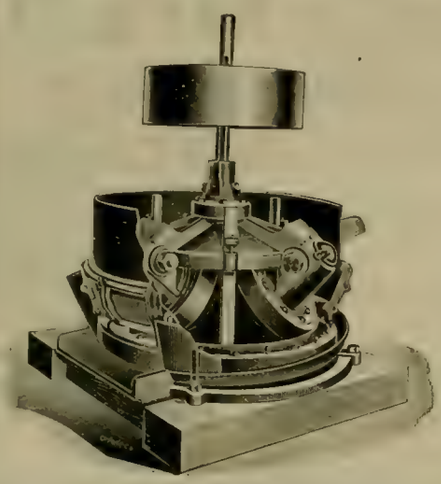

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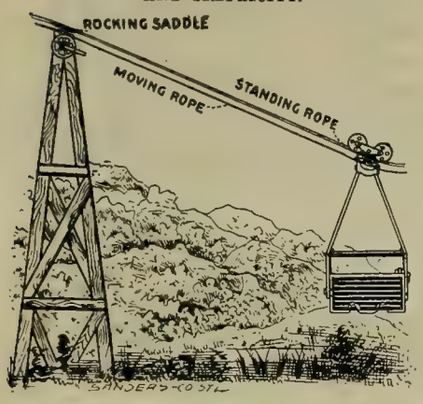

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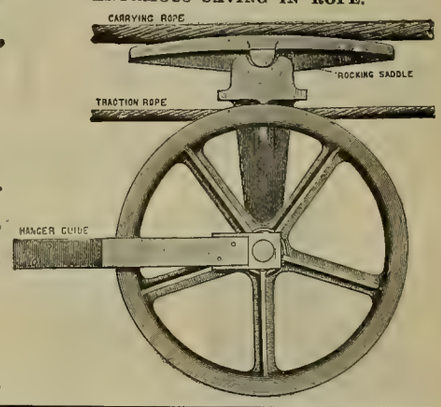

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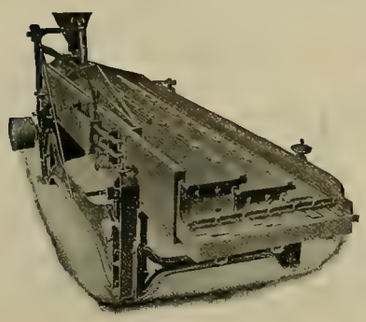

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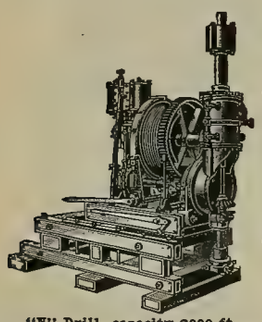

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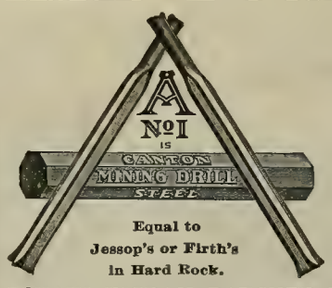

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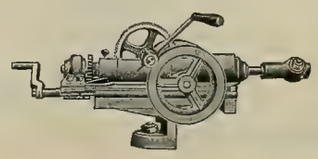

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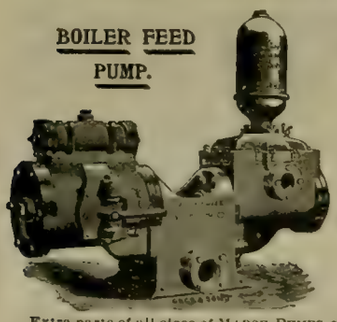

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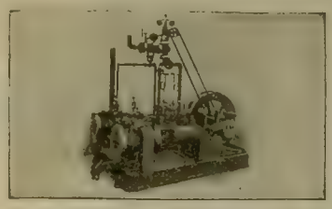

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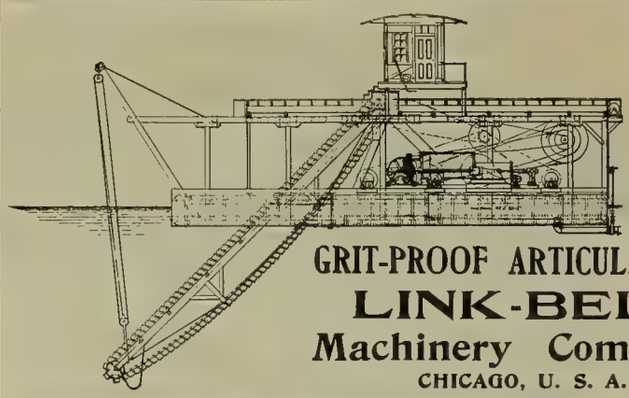

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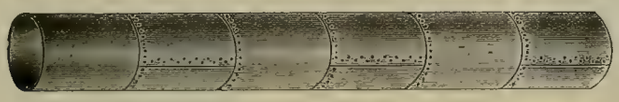

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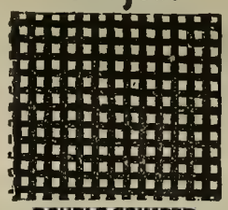

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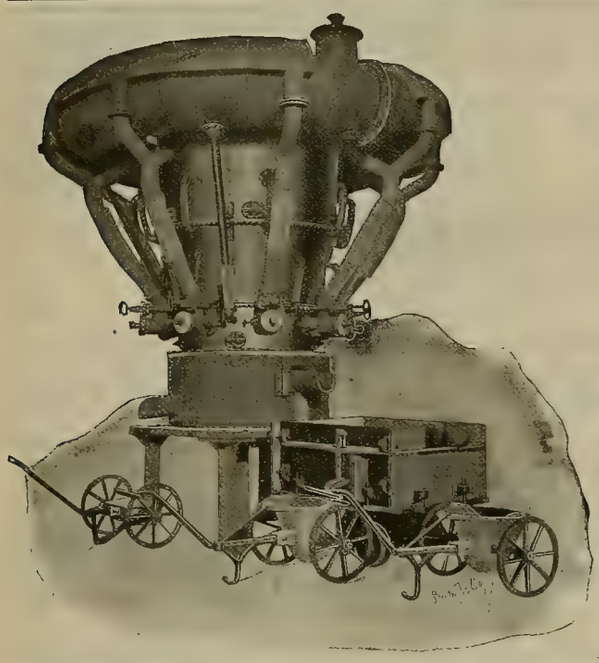

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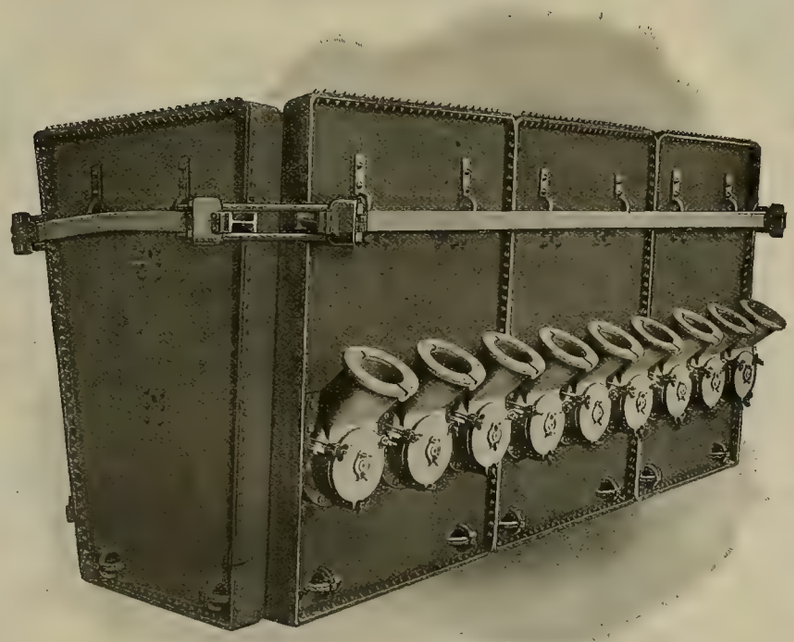

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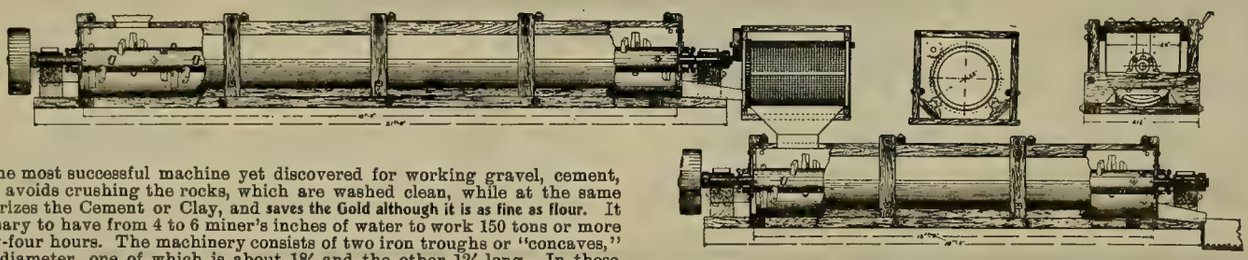

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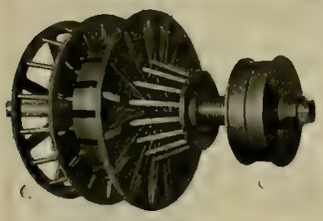

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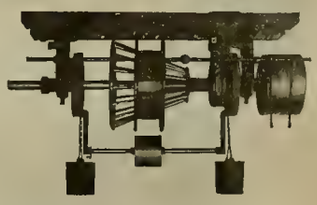

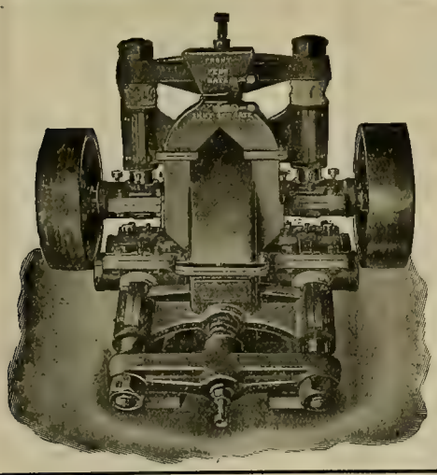

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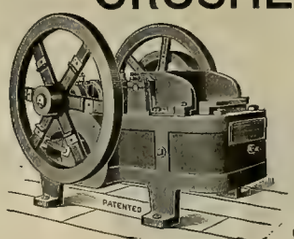

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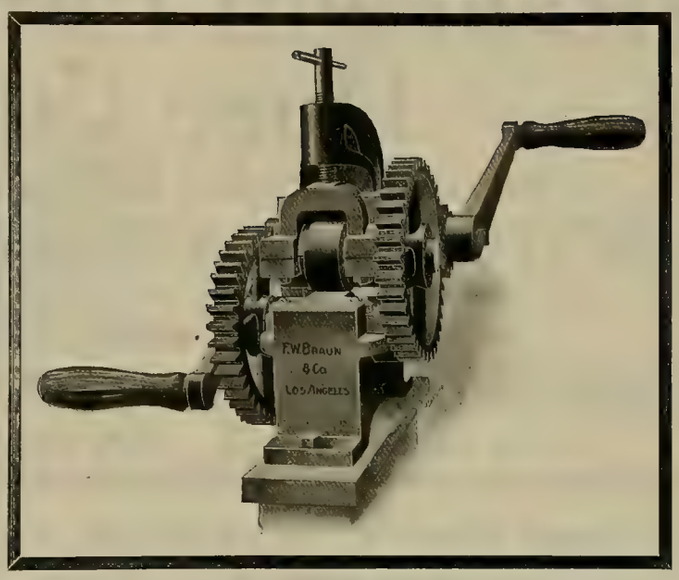

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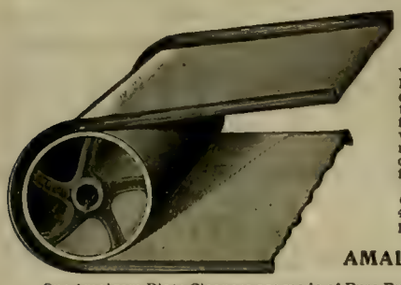

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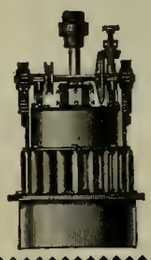

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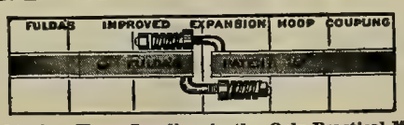

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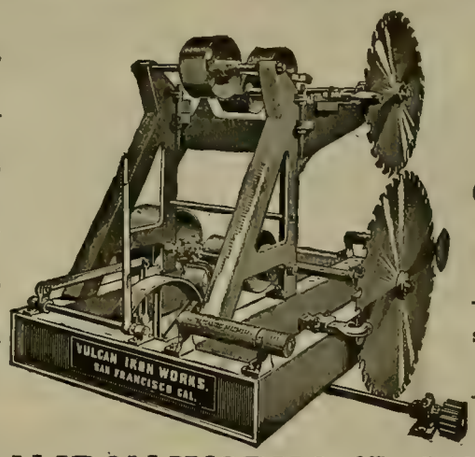

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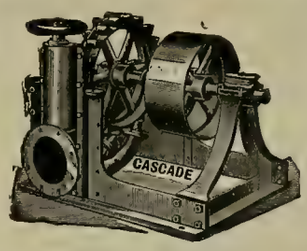

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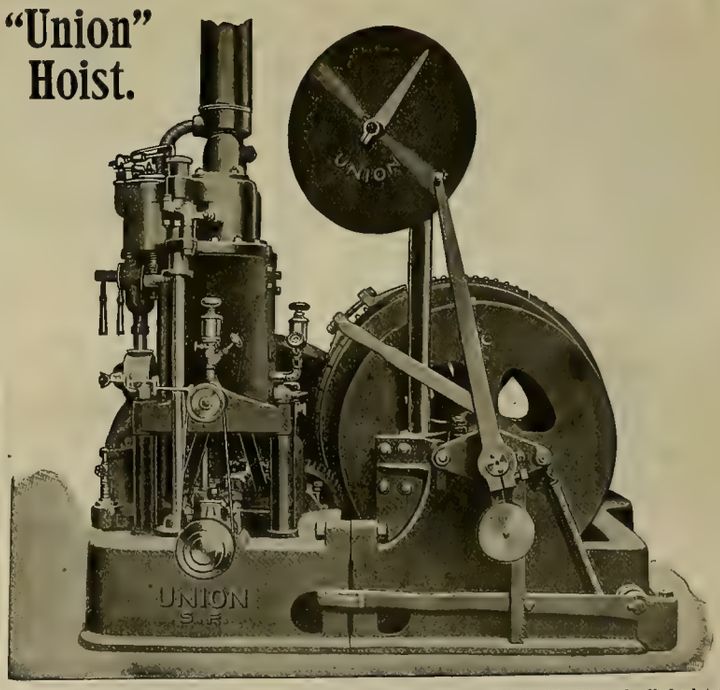

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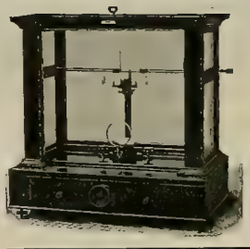

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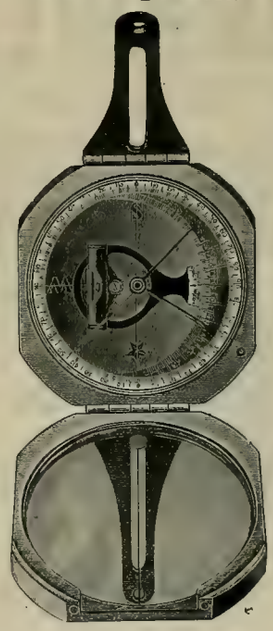

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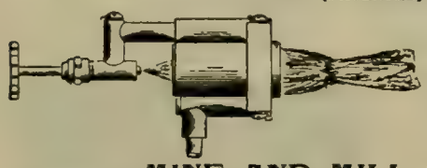

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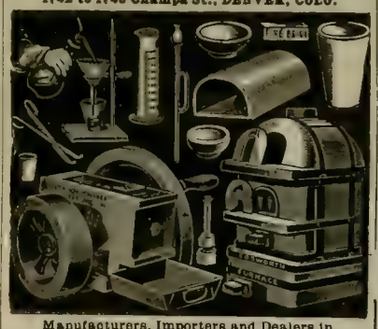

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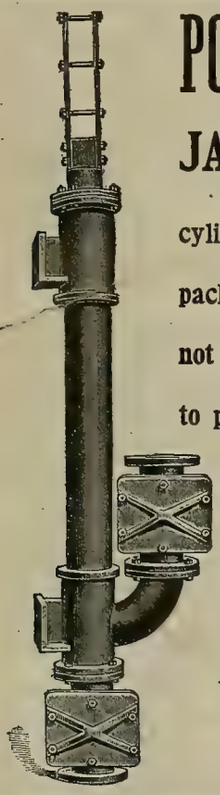

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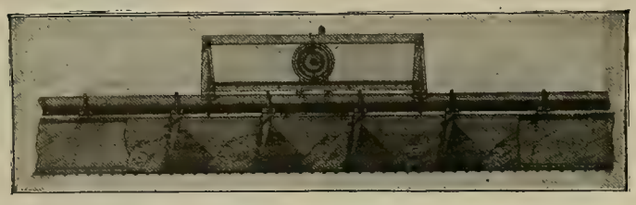

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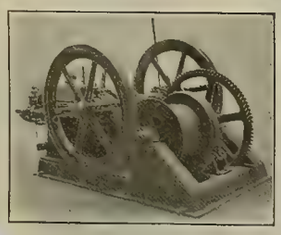

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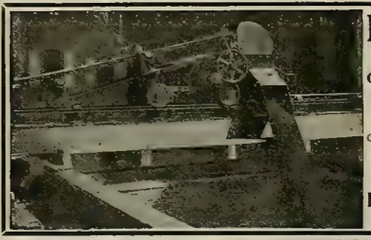

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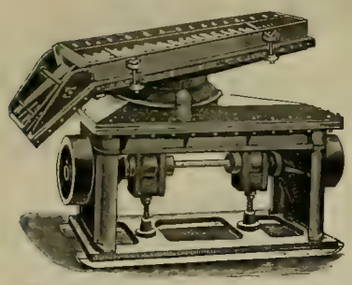

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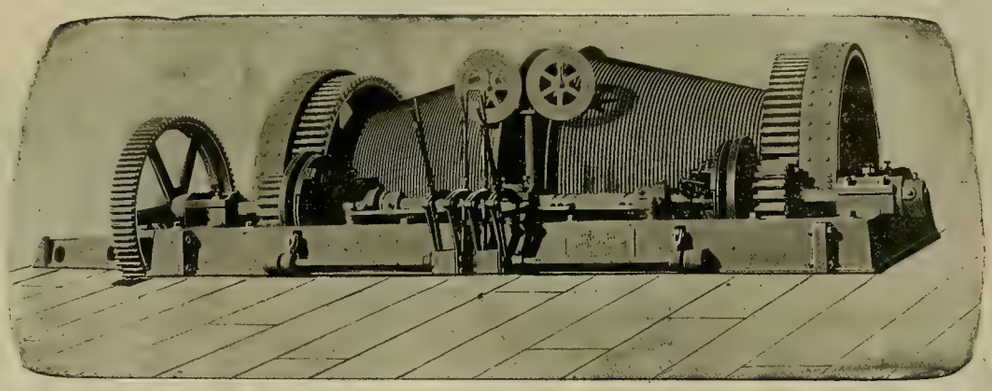

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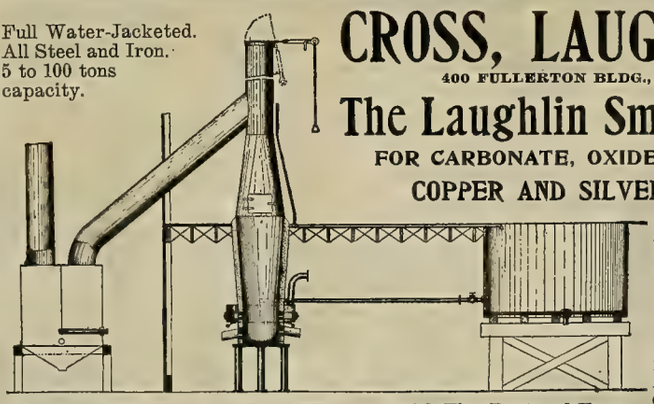

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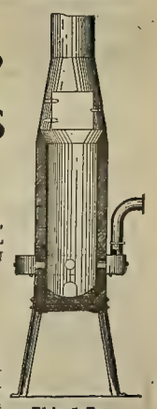

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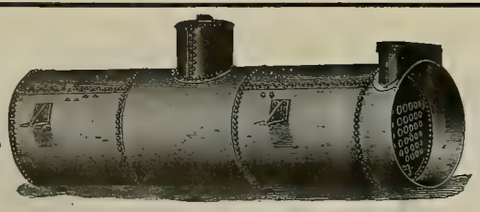

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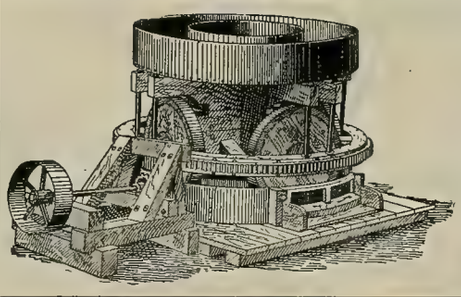

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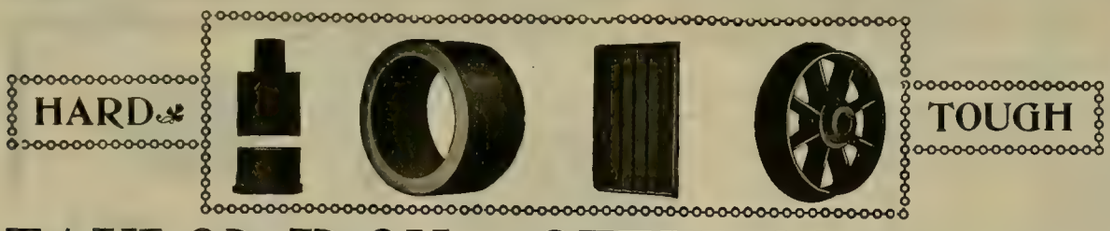

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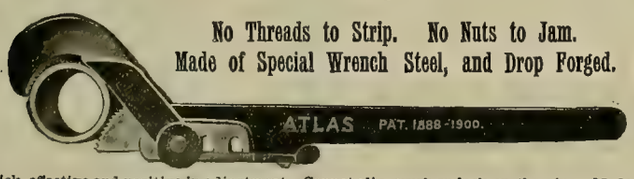

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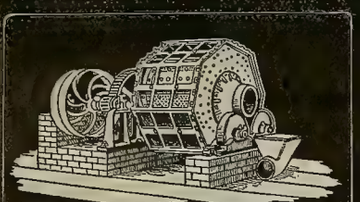

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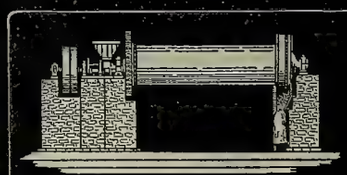

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225

ASSESSMENT NOTICES.

MARIPOSA COMMERCIAL AND MINING COMPANY.—Location of principal place of business, San Francisco, California; location of works, Mariposa County, California.

Notice is hereby given, that at a meeting of the Board of Directors, held on the 13th day of April, 1901, an assessment (No. 22) of Ten ($10) Dollars per share was levied upon the capital stock of the corporation, payable immediately in United States gold coin, to the secretary, at the office of the company, Room 223 Crocker Building, San Francisco, California.

Any stock upon which this assessment shall remain unpaid on the 25th day of May, 1901, will be delinquent, and advertised for sale at public auction; and unless payment is made before, will be sold on MONDAY, the 17th day of June, 1901, to pay the delinquent assessment, together with the costs of advertising and expenses of sale.

By order of the Board of Directors.

ALEX. GRANGER, Secretary.

Office—Room 223 Crocker Building, San Francisco, California.

EUREKA CONSOLIDATED DRIFT MINING COMPANY.—Location of principal place of business, San Francisco, California; location of works, Placer County, California.

Notice is hereby given, that at a meeting of the Board of Directors, held on the 25th day of April, 1901, an assessment (No 30) of one (1) cent per share was levied upon the capital stock of the corporation, payable immediately in United States gold coin, to the secretary, at the office of the company, 214 Pine street, room 31, San Francisco, California.

Any stock upon which this assessment shall remain unpaid on the 28th day of May, 1901, will be delinquent and advertised for sale at public auction; and unless payment is made before, will be sold on TUESDAY, the 18th day of June, 1901, to pay the delinquent assessment, together with the costs of advertising and expenses of sale.

By order of the Board of Directors.

GEO. W. DIXON, Secretary.

Office—214 Pine street, room 31, San Francisco, California.

NATIONAL CONS. MINING COMPANY.—Location of principal place of business, San Francisco, California; location of works, Rich Gulch, Shasta County, California.

Notice is hereby given, that at a meeting of the Board of Directors, held on the 16th day of April, 1901, an assessment (No. 14) of five (5) cents per share was levied upon the capital stock of the corporation, payable immediately in United States gold coin to the secretary, at the office of the company, 773 Mission St., San Francisco, California.

Any stock upon which this assessment shall remain unpaid on the 1st day of June, 1901, will be delinquent, and advertised for sale at public auction; and unless payment is made before, will be sold on TUESDAY, the 25th day of June, 1901, to pay the delinquent assessment, together with the costs of advertising and expenses of sale.

By order of the Board of Directors.

GEO. W. FLEISSNER, Secretary.

Office—773 Mission St., San Francisco, California.

OSCEOLA CONSOLIDATED MINING COMPANY.—Location of principal place of business, San Francisco, California; location of works, Plymouth, Amador County, California.

Notice is hereby given, that at a meeting of the Board of Directors, held on the 23d day of April, 1901, an assessment (No. 11) of one (1) cent per share was levied upon the capital stock of the corporation, payable immediately in United States gold coin, to the secretary, at the office of the company, 307 Montgomery street, San Francisco, California.

Any stock upon which this assessment shall remain unpaid on the 25th day of May, 1901, will be delinquent, and advertised for sale at public auction; and unless payment is made before, will be sold on MONDAY, the 17th day of June, 1901, to pay the delinquent assessment, together with the costs of advertising and expenses of sale.

By order of the Board of Directors.

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LARKIN MINING COMPANY.—Location of principal place of business, San Francisco, California; location of works, near Placerville, El Dorado County, California.

Notice.—There are delinquent upon the following described stock, on account of assessment (No. 10) levied on the 12th day of March, 1901, the several amounts set opposite the names of the respective shareholders, as follows:

Names.	No. Cert.	No. Shares.	Amt.
T. W. Baker	201	250	$5 00
T. W. Baker	202	250	5 00
T. W. Baker	203	250	5 00
T. W. Baker	209	250	5 00
J E Kraffts	271	250	5 00
J. E. Kraffts	354	250	5 00

And in accordance with law, and an order from the Board of Directors, made on the 12th day of March, 1901, so many shares of each parcel of such stock as may be necessary, will be sold at public auction at the office of the company, 112 Main street, San Francisco, California, on WEDNESDAY, the 15th day of May, 1901, at the hour of 2 o'clock P. M. of said day, to pay said delinquent assessment thereon, together with costs of advertising and expenses of sale.

N. F. REMINGTON, Secretary.

Office—112 Main street, San Francisco, California.

Special Meeting.

OXFORD BETA TUNNEL AND MINING Company.—There will be a special meeting of the stockholders of the Oxford Beta Tunnel & Mining Company, to be held at the office of the company, No. 135 Geary St., Room 111, San Francisco, at the hour of 4 o'clock P. M., on the 4th day of June, 1901, for the purpose of increasing the capital stock of the company from twenty-nine hundred shares of the value of one hundred dollars each to one hundred thousand shares of the value of two dollars and fifty cents each. By order of the Board of Trustees. W. H. KNIGHT, Secretary.

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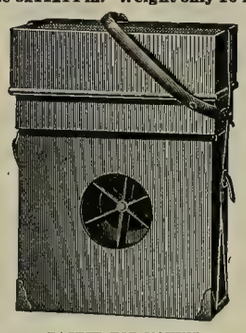

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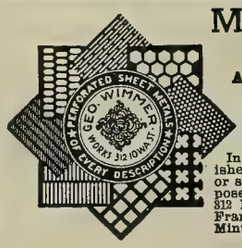

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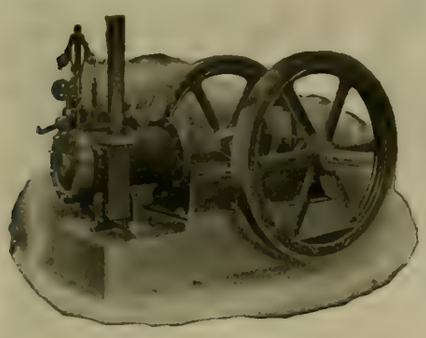

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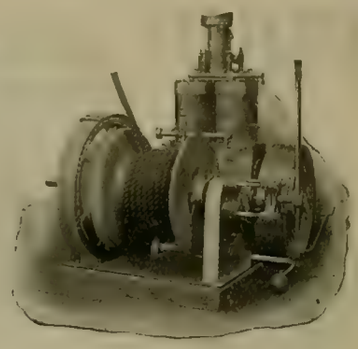

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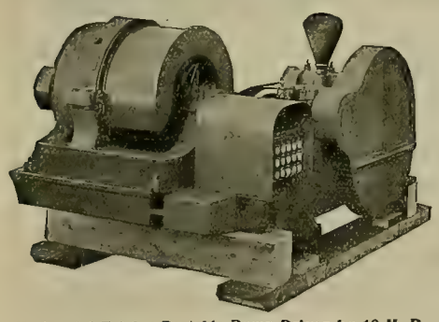

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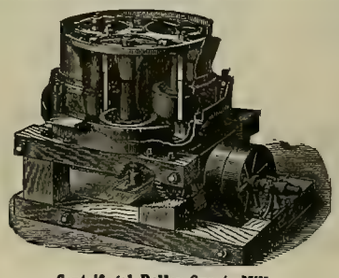

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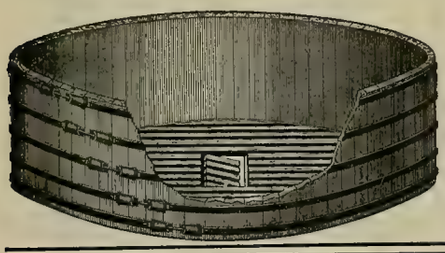

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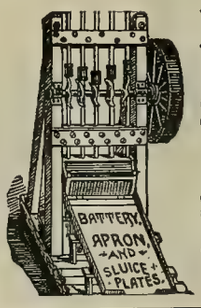

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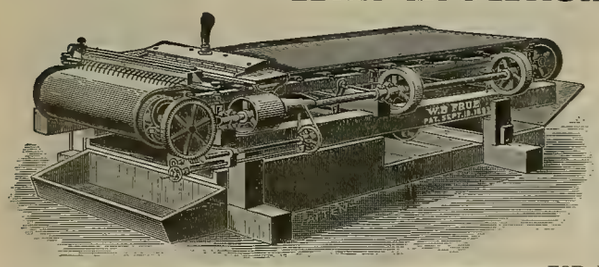

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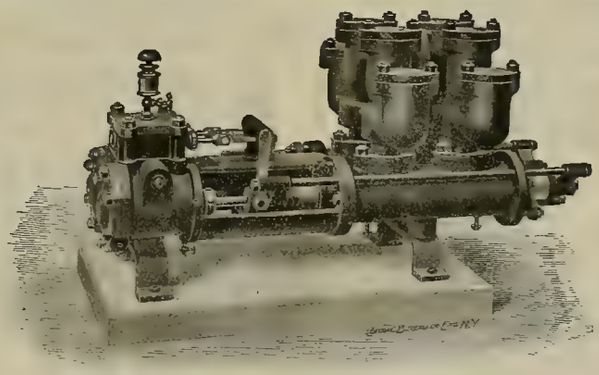

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MINING AND SCIENTIFIC PRESS.

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Mining in the Yukon Country Then and Now.

March, 1901, is not many months away from August, 1898, as time goes, even in the Yukon country; but the advance in mining, though this difference of time, can well seem a marvel to those who knew the land first in the older time. Each of the two illustrations on this page is typical of the Yukon mining of the date of the original photograph, and in contrast present a fair idea of the nature of the change that the interval of time has made.

The two men at the windlass were of the thousands who fought their way on foot into the country late in 1897 and early in 1898. Provided with few and poor tools, and no engines or machinery, they won gold from deep-lying frozen ground with fire and by hand work with bucket and windlass. They lived largely in tents and largely without even the commoner conveniences of the civilization they had left. The photograph was taken in one of the stampede camps in August, 1898.

The other illustration is from a photograph taken in March, 1901. The men who are grouped about the mine shaft came into the land in a palace car, a few hours of care-free, luxurious railroad travel, in place of the weary days and weeks on foot, fighting with every step frost and famine. They—and, indeed, all the miners there now—have the best mining tools, engines and machinery adapted to the special physical conditions under which mining is carried on there. Three years in the Yukon and there is no longer any difference between mining there and in the mountains of Colorado or Montana.

Placer Mining Shaft in Race Horse Group, Atlin District, B. C. (See page 221.)

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THE business men of Fergus county, Mont., have associated to advertise the mining resources of that county with a view to attracting investors. The idea is excellent, and, judging by the results of similar action by the town of Georgetown, in Colorado, it should well repay its promoters the effort and the money. In these hurry days, with mines offering from everywhere, if any district would receive attention from investors it must make itself known by advertising.

THE profit-earning possibilities of deep mining under existing economical conditions has received another demonstration, this time on the Comstock. For a number of years the lode had been abandoned below the level of the Sutro tunnel, about 1700 feet. Lately the old levels below this point have been unwatered and mining resumed as far down as the 2150-foot level. The Con. California & Virginia, taking ore from this reopened ground, have announced a dividend, the first paid for six years.

FIFTY years ago the student or learner in mining or metallurgy was obliged to initiate his own studies, the engineer had only one way to get knowledge and that through the shop. Now all such learners have choice of opportunities for learning. The chief advantage of such chance for scientific training is the economy of time. The old way is hard and wasteful. Yet the tendency of the times is to overestimate the value of theoretical knowledge and to undervalue the need of practical training. There never has been any royal road to learning and there never will be. It is made much easier to learn than it used to be, but the homely requirements of diligence, practical work and steady effort are as requisite to success as they ever were. The technical school and the scientific training, now so general and easily procured, are grand adjuncts, but they are only adjuncts, and to the learner nothing will take the place of actual practice. The schools are best aiding the student when they confine their teaching more to principles than subjects.

CABLEGRAMS say that China is suggesting to the Powers the complete opening of Manchuria to exploitation industrially by all countries. If true, the action contemplated is of considerable importance commercially, as well as politically. Manchuria is very rich in minerals. Gold—placers and lodes—silver, copper, lead, iron and coal all exist in minable deposits of great extent and excellent profit-earning possibilities. The placers are, if anything, richer than the Siberian, and have the advantage to the outside investor that they have not been worked out. The lode deposits are untouched as yet, and the very little coal mining done has done nothing more than prove the quality and probable extent of the deposits. The climate is favorable to mining operations throughout all the year. Timber of good quality is in excellent supply. The means of communication and transport are already better than in Siberia and are capable of rapid improvement. The resident population, estimated conservatively at 10,000,000, are physically strong, industrious and teachable. They will make good miners and workmen under instruction. In this respect they are an improvement on the Russian workmen in the Siberian provinces adjacent. It is to be hoped, if the country is to be thrown open for exploitation, that in the conventions arranged for foreign industrial undertakings the procedure of initiation will be shortened in the consumption of time, the value of which is with difficulty recognized by the Oriental mind.

THE postmaster of Nome City is vexatiously interfering with the sending out of letters from Nome by private carriers, who come out over the ice by the Dawson route. He is reported to have announced that any one carrying letters will be arrested, imprisoned and have the letters confiscated, and that in issuing this order he was strictly within the Constitution. The words of the postmaster are as absurd as his threatened action is pettily mischievous. The Constitution has not been decided to extend to Alaska; in fact, Congress has legislated as if it did not. The Constitution does not forbid carriage of letters by private individuals. Statutes which have not been expressly extended in operation to Alaska have permitted the carrying of letters by private corporations, provided the Government charge was paid. Wells, Fargo & Co. for many years throughout the West carried and delivered letters, paying the Government postage out of its own charge. It continues at this time to carry newspaper mail without paying such charge. Aside from the illegality of the action contemplated, the conditions surrounding the mining industry of Alaska are such as to make it a violation of common business sense.

TWO DECISIONS of interest to petroleum and natural gas miners have appeared in late published court reports. The Supreme Court of Pennsylvania decided in January, 1900, that the owner of an oil well had a right to use a gas pump to increase the production of his well, even though it should reduce the production of wells on adjoining properties. The Supreme Court of Indiana rendered a decision in June of last year declaring that the owner of a natural gas well had no right to use a gas pump to increase the flow of his gas well and thereby reduce the natural flow of gas into wells of adjoining land owners. Though one decision relates to oil and the other to gas, both decisions are on the same principle and are opposed to each other as precedents. Being decisions of State courts neither is final, as the same question can be brought before the United States courts in the new discoveries in the West on public lands. Meanwhile the petroleum miner in these new fields will choose which of the two is the more profitable to him and use a gas pump or not, accordingly. Ultimately it would seem as if the later decision must prevail. The court, in speaking of the ownership of several parties in surface lands over the same reservoir of gas, says: "The surface proprietors have the right to reduce to possession the gas found beneath. They could not be absolutely deprived of this right without taking private property. But there is a coequal right in all such owners to take the gas from the common source of supply. * * * There is something in the nature of unity in their possession of the gas in the reservoir. * * * The final conclusion of the court is that one common owner of the gas in the common reservoir cannot divest all the others of their rights without wrongdoing. * * * Independently, however, of any statute, * * * the common owners of the gas in the common reservoir, separately or together, have the right to enjoin any and all acts of another owner which will materially injure, or which will involve the destruction of, the property in the common fund, or the supply of gas." This language may indicate the way the courts will look at the practice of boring oil wells as close to the lands of an adjoining owner as is practicable in order to drain away all possible of his oil before he sinks his own wells.

The Law of Extralateral Rights.

The litigation over extralateral rights to ore-bearing deposits is seemingly endless. At the time the statute giving them became law miners had recognized only one kind of lode deposits, the typical gold-bearing quartz ledge of California, and knowledge concerning that was rather indefinite. That quartz ledges had dips, spurs and angles was recognized, and that the dip would carry many ledges followed downward, outside of the surface limitations of a claim the extent of which then seemed reasonable, led the mining district organization into the declaration of extralateral rights as subject to appropriation with the outcrop or apex of a lode. The statute law followed the well meant declaration of the old miners.

The mischief of the doctrine was not foreseen then. There was little deep mining of the ledges and the fact that many different parallel apex lines could and would gather with depth into one was given little importance. The flat lying contact deposits of metal-bearing rock were not known nor were lodes which were zones of local enrichment in eruptive rocks without defined walls. All of these lode phenomena are known now, and the mischief of the error has been demonstrated by the endless litigation that arises from honest differences as to questions of fact, and of differences as to what are facts. Not only does the question of fact arise as to where the apex of a disputed lode is, but as well the question what is the apex. The latter question particularly becomes pertinent in some copper-bearing deposits the origin of which is in zones of local enrichment in eruptive rocks, where there are no walls and no structural formation differences, only differences of mineralization. Characteristic of these is the condition that they are not as mined near the surface the original deposit in place, but in a secondary situs of moved surface values. By natural chemical and physical changes the values have concentrated downward and it may be more or less laterally. The surface has become more or less altered and obliterated. The intricate natural phenomena that have resulted only become visible when the act that invites the litigation is completed. They cannot then be said to be understandable.

The Butte, Montana, litigation over copper-bearing deposits, the litigation now on between two mining companies of Grass Valley in California, are the fruits of a policy on its face fair, and of a declaration of law more than ordinarily intelligible and capable of uniformly the same meaning. The inherent vice of it resides in the condition that the facts the law was intended to construe are not construable by it. It is part of the inevitable friction between an untenable theory and unalterable facts. The facts cannot give way, so the obvious alternative ought to be to eliminate the friction of costly litigation.

It is not possible to take away grants of vested rights that already exist in extralateral rights. Indefinitely into the future they must chance it as to litigation. But there is no reason why, knowing an error that can be corrected, that the error should not be corrected. The law of location can be changed so that a reasonable surface area is granted without extralateral rights. No hardship is involved to prospectors in this limitation. Mining exists and is profitable in every other mining country under this limitation and it has been exceedingly profitable under these conditions in the one district in the United States—Leadville, Colo.—where its acceptance was enforced by reason of the unalterable facts making an absurdity of the untenable theory.

The subject is not included specifically among the subjects to be considered at the next mining congress at Boise, but it is an exceedingly pertinent one and simple enough to receive final action. The weak point in meetings of the congress has been the indirection and lack of finality to its actions. The straight proposition of the change in the statute here suggested made specific and without the appendage of other changes in the mining statutes, however desirable, cannot be dodged by an assertion of vagueness and indefiniteness as to what is wanted.

Concentrates.

FISSURE VEINS can occur in all rock formations; they are found in limestone.

IDAHO has the ninth place in the gold-producing States, the fourth in the silver and the first in lead.

FIFTY-TWO out of fifty-eight counties in California have a commercial production of one or more of forty-six mineral substances.

SO FAR three cities are announced as candidates for selection for holding the next session of the International Mining Congress—Los Angeles, Cal., Knoxville, Tenn., and Cleveland, O.

IT is estimated that the Sudbury nickel deposits contain enough of that metal to supply the consumption of the next century at the present rate of use. At the present time they supply 40% of the total requirement.

THE consumption of quicksilver may soon be increased by its use in incandescent electric lighting. A recent discovery employs incandescent mercurial vapor in a glass tube as an illuminant. The light is powerful and steady, but disagreeable in color. It is expected to remedy this.

IT seems from the result of a recent trial in Montana that Congress in 1875 passed an Act granting railroads right of way over mining claims that are not patented, the miner only having a possessory right. There is no recourse for damages when mining improvements are affected by the operation of the law.

AMONG wants of the mining industry at the present time is a process or manipulation by which petroleum can be applied to produce iron and steel direct from the ores, cheaper than is possible by the use of coke. Petroleum is already being successfully and economically used in ore roasting, in pyritic smelting and in remelting pig iron for casting.

MANUFACTURERS of electrical motors are now willing to guarantee much higher efficiencies in these machines than only a few years ago. Then 80%, or at the most 85%, was all that could be obtained. Contracts are now made guaranteeing as much as 91% for large motors and 87% for small motors. These percentage guarantees are contracted for with three-fourths and half loads.

A SLIP is a plane, either a bedding plane or more often a plane of fracture across the bedding planes, on which there has been a movement of one rock mass relative to the other; or it is applied to describe the rock mass that has moved relative to the other. Its use is limited to describe a localized phenomenon rather than one extending over considerable area. The latter would be described as a fault plane.

In operation as prime movers for electric generators, the piston-driven steam engine has less steadiness of motion, but in regulation responds quicker to the governor than a water wheel. This last is almost absolutely steady in its motion, but as good regulation as with a steam engine is not had. The one machine combining the close regulation of the steam engine with the steadiness of the water wheel is the steam turbine.

ARSENIC is widely distributed in minerals, but rarely occurs in mass sufficient to make an ore that it will pay to mine. The consumption in the arts is so relatively inconsiderable that by-product production of it in connection with the treatment of other ores in which it appears as an associated mineral has supplied the larger part of it. There is at the present time no manufacture of it in the U. S., probably because the ores have not been provided. Arsenolite, the white oxide of arsenic, commonly known as white arsenic, is a common form in which arsenic is marketed. It is worth in New York about 4 cents a pound. In the manufacture of lead shot about 2% of arsenic is employed with the lead.

THE State of Colorado has in force a mining statute of her own which is in line with common sense as regards the location of mining claims. It provides that before filing a location for a claim the discoverer shall locate his claim by sinking a shaft on the lode to the depth of at least 10 feet from the lowest part of the rim of such shaft on the surface, and the shaft so dug must expose the vein on which the location is based, and it is not sufficient that a discovery is made of some other vein within the limits of the claim. The Supreme Court of Colorado has just sustained this law by holding that a discovery made subsequent to the location could not relate back to the date of that location so as to cut out intervening rights.

A BEDDING PLANE is a descriptive term employed in geology to describe the seams in rock formations that perpetuate the horizontal lying planes of contact of the successive layers of rock forming silts as they were laid down or bedded in the marginal sea waters. The expression is synonymous with stratification plane, though custom limits the latter more particularly to describing the contact planes between rock formations that are different, as, for example, a sandstone and a shale. The term "bedding plane" would be applied to the contact planes of layers in the sandstone or in the shale. Joint planes are the planes of the cross seams connecting the bedding planes. A good development of bedding planes and joint planes makes a rock "blocky."

THERE is hardly a construction problem of mine opening, mining machinery or methods which does not admit of more than one answer. As all the answers either directly or indirectly mean dollars and cents, the importance of obtaining the answer which means the least outlay or the largest income is apparent. The difference between the old failure of many mines to be profit earning and the present success of the same mines is largely due to a late recognition of what is here stated. Through many years of the early history of Western mining the practice was made subordinate to an attempt to fit theories to facts the existence of which was sometimes wholly ignored. The rational practice of to-day is to ascertain the facts and deal with them as if there was no theory.

THERE is such a thing as building an engineering structure too well—which means, of course, too expensively. The object of such construction is useful service of a particular kind and it is the duty of the engineer to provide the service at the lowest cost. The dollars that it costs are the measuring rule for testing the structure. There is no necessity of providing refinements in finish or materials that do not correspondingly increase the value of the service. If the service is rendered economically and satisfactorily without certain additions to construction, those additions should not be made. If the useful service demands refinements in material and construction, they are properly part of it. As a rule, the engineering structures required in mining and metallurgy do not require costly refinements of workmanship. They very generally do rough work and are expected to have a limited period of life. The engineer is called on only to plan for the exact amount and kind of work, and for no more.

THERE are two general types of direct acting hydraulic air compressors, the one which works by entraining air and compressing it by the static head of water, and the other operating on the hydraulic ram principle and effecting compression by impact, using the hydraulic head of the moving water. Both are specially adaptable to low water heads and large volumes. Both require very little manual attendance. The efficiency, the ratio of useful work to applied weight of water multiplied by its head, varies with the different machines of each type. With the best of both the efficiency is over 70%; exceptionally it may reach 80%. The hydraulic ram type of machine is to the unit of production less costly of installation and more portable than the other type. The money cost of installation per unit of useful production for either type of these hydraulic compressors is more than for the water wheel and piston compressor. The economy of their use as compared with the latter is a matter of calculation for each special installation. It is for the direct hydraulic types the sum of the larger interest and replacement cost and the lesser operating cost, in comparison with the lesser fixed costs plus the larger operative costs.

TABLES of the flow of water through pipes of different diameters and under different heads are given in Trautwine. The machinery establishments also publish such tables. Every problem that arises is, however, special, and the tables do not give the data of delivery for the different lengths, but for a standard length of 100 feet ordinarily. To use such tables where the question is to know the diameter of pipe necessary to bring a certain quantity of water in a given time where the distance and total fall from inlet to delivery are known, proceed as follows: Divide the total fall less 1 foot by the number of hundreds of feet in the distance to get the fall for 100 feet. Divide the quantity of water by the number of minutes in the given time to get the required delivery per minute. If this quantity is in gallons reduce it to cubic feet. These two quantities, fall per 100 feet which is tabled as friction head per 100 feet and cubic feet of discharge per minute, are tabled in couples for different diameters of pipes. Inspection will ordinarily find the couple in the table so that the diameter of pipe required can be read directly. The refinements of an engineer's determination are omitted. It is safer in practice to take a fraction larger diameter pipe than the exact figure calls for. If there are a number of bends allowance has to be made for them by reducing the figure of the total head taken to determine the average fall.

AN efficient, satisfactory powder thawer can be made by a local tinsmith in any mining camp whenever it happens that the storekeepers do not have any in stock. Make of heavy sheet tin a pail of depth exceeding by about 1 inch the length of the powder cartridges and of a diameter that will just hold the number of sticks required for a round of holes. This pail should have a strong wire rim outside of the barrel and should be provided with a bail and a cover. Make a second pail of 2 to 3 inches greater depth and 3 to 5 inches larger diameter. The bottom should be metal heavy enough to stand fire, copper preferably. The barrel and top, which should be soldered solidly together, should be made preferably of heavy galvanized sheet so as to stand the rough handling such tools always receive around a mine. This pail should also be provided with a bail. The top should have cut in it a circular hole, of slightly larger diameter than the barrel of the smaller pail, the edges of which would engage and sustain the wire rim of the smaller pail. The top should be provided with one or more vent holes for steam and about three spring clips disposed to slide on the cover of the smaller pail and hold it down against its buoyancy in the water. To use put in the larger pail a sufficient amount of water. Heat to boiling or a sufficient temperature. Remove from the fire and set into it the smaller pail containing the frozen powder. Cover the pail with old sacks and let the powder thaw by drawing heat from the water. It will be found to thaw evenly and without danger of spontaneous explosion. After removal of the thawed powder the small pail should be washed with hot water to remove all traces of nitroglycerine. It will be noted that the construction suggested absolutely keeps water and steam away from contact with the powder and that the manner of using effects the thawing at a low temperature. Under no circumstances should dynamite be thawed by putting it in the water nor at a high heat. In storing powder so arrange it that it is either kept constantly frozen or constantly thawed, avoid alternations of conditions, as they impair the quality and make its handling more dangerous.

THE choice of iron or steel for the making of riveted sheet-metal water pipe is a question of comparative cost. By that is not meant simply first cost when it is put in place, but the annual cost or charge which is the quotient obtained by dividing the sum of the first cost in place and the cost of maintenance during all the years of life of the pipe by the number of years of probable life before it will require replacement. It is assumed that the water pipe is a permanent betterment, though in the case of some isolated placers, into which the pipe-making material must be packed at a heavy cost, the life of the mine is the life of the pipe for the estimation, and the pipe metal the use of which would make the first cost least would be the choice. Of the two metals in first cost per pound of the commercial grades employed in pipe making, steel is ordinarily the lowest in price. The tensile strength of the two metals in these commercial grades is for iron 48,000 pounds per square inch and for steel 75,000 pounds per square inch. The strength of the double riveted seam is .70 of the metal. Then for equal resistances to strain in the manufactured pipe iron having net 33,600 pounds of tensile strength and steel 52,500 pounds, the respective thicknesses of metal required would be in the ratio of 1.56 for iron to 1 for steel. There are grades of both iron and steel of higher tensile strength, but for water-pipe building the commercial grades answer every engineering requirement and are more economical. The meaning of the ratio is that it takes approximately 1.56 times as much iron as steel to construct a given pipe. There is, however, a minimum thickness of sheet metal which can be used for a pipe, this minimum thickness being in correspondence with the diameter and independent of the strain. Within the limit of safety of allowable strain, where minimum thickness is required for structure, iron or steel could be used without affecting first cost very much. There is also a maximum of thickness of sheet metal limited by the mechanical difficulties of bending and riveting. There is a great range in the carbon percentages of the commercial steel employed for riveted pipe. These slight differences in composition would seem to result in considerable differences in the metal when applied to this particular use. The behavior of the metal under service has varied so widely and inexplicably that it would seem the difference of conditions must reside in the composition of the metal. Very common or inferior iron does not exhibit any unexpected variations of behavior in service, while steel does. With the latter experience is relatively limited in time, though construction at this time is almost exclusively with it. It is difficult to lay down an absolute rule for practice, owing to lack of knowledge of the effect of the slight differences in sheet steel composition. Some generalizations will, however, be of use in guiding decision in minor problems. For hydraulic mining, where pipes have to be frequently handled, taken apart and put together, iron is preferable; it stands rough handling and lack of care better and is easier manipulated by unskilled labor. Where the pipe has to be made in the field remote from shops, and where the amount of work to be done does not justify the special employment of skilled workmen, iron is preferable. For pipe construction where the safe strain is within the minimum allowable structural thickness of metal, iron should be preferably used. For pipe where the safe strains would require of iron thicknesses of say .45 inch or more steel should invariably be employed. For pipe where the safe strains would require thicknesses of metal more than the minimum allowable, and less than .45 inch for iron, steel is almost invariably the more economical and therefore preferable. The protecting coating given the metal is a large factor in determining the life. Both the material and method of application of the protecting coating have been much improved of recent years. With the improvements it seems probable that the life of iron and steel in pipe would not materially differ. With the inferior protection that has been given, some iron sheet-metal pipe is known to be after thirty years service not appreciably impaired. Steel sheet pipe has not been used except during the last seventeen years. With inferior coating some steel pipes after twelve years service are known to be practically unimpaired. If steel pipe under improved coating can be assumed to have the same life as iron, it is just about one-half as costly as the latter. If steel pipe can be assumed to have 40% of the life of iron pipe, it can cost no more, and will very probably cost less as a consequence of the lowering of cost of production of the metal by the time the replacing pipe is required. With steel pipe assumed to have anything between 40% of and equal life with iron pipe, steel pipe is the cheaper and therefore preferable. The question is one coming up continually now with large power installations and with the additional water supplies that the rapid growth of cities necessitates. There is an opportunity here for the gathering and comparison of the results of service of pipes, particularly their coating and life. The data and deductions would be technically and educationally very valuable.

Power Required by Stamps.

To THE EDITOR:—A letter by Henry Louis and relating to an article of mine on the "Power Required by Stamps" appeared in a recent issue of the MINING AND SCIENTIFIC PRESS. Mr. Louis has evidently not carefully read the article in question, inasmuch as he has assumed that I meant "indicated" horse power when I wrote "actual horse power." Had Mr. Louis read the article carefully, before criticising it, he would have noticed that I was particularly careful not to employ the term indicated horse power, but invariably used the term actual horse power. It may simplify matters to state just exactly how the power used by a stamp was obtained. It may also be useful to such of your readers who would like to verify the results.

The mill after running normally for some hours, to warm up bearings, etc., was in shape for testing. The engine was indicated and the power shown was 34.65 H. P. The rock breaker was thrown off and the engine indicated; power shown was 29.7 H. P. Therefore the rock breaker consumed 4.95 "actual" H. P. The stamps were thrown off next. Power now shown was 11.85 H. P. The stamps, therefore, consumed 17.85 actual H. P. (= 1.785 H. P. per stamp). The vanners were thrown off; power shown, 9.35. Therefore the power used for vanners was 2.50 actual H. P. The engine belt was thrown off and the final power shown was 4.05 H. P. Therefore the line shafting used 5.30 actual H. P.; the engine used up in its own friction 4.05 H. P. The total of all these powers—34.65— is the indicated horse power to run the mill as a whole.

I hope I have convinced Mr. Louis that I know the difference between "indicated" and "actual" horse power. I suggest, in all courtesy, that Mr. Louis misread my article through not appreciating the fact that "actual" horse power is used throughout the Western States as synonymous with the term brake horse power. Really, the term actual horse power is more correct than brake horse power, inasmuch as this power is almost invariably found, in a mill, by means of the indicator, and not a brake.

The second point made by Mr. Louis is that the friction lost in the guides is "quite independent of the number * * * of the guides!" This argument is deduced from the well-known law of friction that the area of rubbing surface has no influence on the amount of friction developed. This law is so well established that it cannot be disputed. Had Mr. Louis given the matter careful thought, he would have seen that his deduction is quite inaccurate. The guides act as a couple to resist the rotative action of the cam acting out of the center line of the stem. The result is that the stem presses with a pressure of, say, 30 pounds against the lower guide to the right, and with a pressure of 30 pounds against the upper guide to the left. In other words, there are two equal and opposite pressures against the guides. Therefore the pressures against the two guides must be considered separately. The practical result is that there is twice the power lost by friction in the two guides than there is in either upper or lower guide taken by itself. Mr. Louis has overlooked this.

The next point made is that the effect of inertia is exaggerated, inasmuch as I have calculated the effect practically twice over. This is not so. I figure that the total power to operate a stamp is the power required for the actual lift, plus the power lost in friction. Each is considered by itself. Mr. Louis and I both agree that the stamp is lifted considerably higher than the cam lift. It is agreed that the power required to do this must come from the engine. In the formulæ and worked examples given in Mr. Louis' book on gold milling no hint is given to this fact. However, the dead lift of the stamp cannot be used in figuring the power, but the actual lift due to the dead lift plus inertia.

Mr. Louis rather ignores the idea that the dynamic pressure of cam against tappet is higher than the dead or static pressure. In other words, that a 850-pound stamp can under certain conditions give an average pressure of 990 pounds against the cam. Surely, if Mr. Louis agrees to the influence of inertia against stopping, he must admit the inertia against starting, and, further, that the action will result in a blow being given by the cam against tappet much in excess of the dead weight of the stamp. From the basis that increased height of lift due to inertia may be taken as a measure of the inertia against starting, I calculated that the dynamic pressure of an 850-pound stamp was, in the case in point, 995 pounds. From a phenomenon in the stamp diagram, to which I believe I first called attention, I found that the cam struck the tappet an initial blow of 1700 pounds, and that the average pressure was, therefore, 990 pounds —a remarkably close agreement. I consider this point proved. Now, the pressure between cam and tappet being greatly in excess of the dead weight of the stamp, it is plain that in calculating the friction lost in various parts of the stamp mill one must use this dynamic pressure, and not the dead weight.

To those who cannot follow this line of reasoning a simple demonstration can be made to prove that inertia against starting will greatly increase the effect of weight. Take a rock of a size that a piece of thin string can lift it safely when the rock is gently raised. Now, raise the rock sharply and with a jerk, and the string will break. This effect is caused by inertia and the strain on the string may be many times the weight of the rock.

Mr. Louis admits that his formulæ do not give accurately the power required to lift a stamp; he prefers, however, to consider the discrepancy as being due to bad workmanship rather than inaccuracy of his formulæ. I consider the discrepancy as being due to both causes. One great use of my formulæ is to check up the workmanship of the millwright. I would consider that a mill was well built and well designed if the actual power did not exceed 5% more than the calculated power. In the example chosen in my article the figures were obtained from a mill designed and erected by myself with every care to prevent excessive friction losses. If there is any safety in numbers, I may give some results from the justly famous Drumlummon mill, Montana, which is generally acknowledged to be one of the best mills ever erected on this continent. The stamps were 750 pounds, 8-inch drop, ninety drops per minute, and used 1.869 "actual" H. P. Calculating from my formulæ, the power was 1.826; Mr. Louis' formulæ gave 1.578 H. P. Mr. Louis' formulæ show that 0.291 H. P. was lost per stamp through faulty workmanship, or 17½ H. P. in the entire battery. This, to say the least, would be poor work. My formulæ show that .043 H. P. was lost per stamp, due to defective workmanship, or 2.5 H. P. in the entire battery, thus bearing out the reputation of the mill.

Without in any way detracting from any credit due to Mr. Louis, I may say that, while my formulæ work out in practice, his do not.

Leadville, Colo., April 29. A. W. WARWICK.

A Gasoline Hoisting Plant.

The Crown Point and Virginia group of mines is situated at the head of Virginia canyon, midway between Central City and Idaho Springs, Colo. The main shaft is down 750 feet, and for years has had the unenviable reputation of having the worst mine water in the State of Colorado. Unfortunately, it is the only supply of water available for the boilers, and the troubles occasioned by its use have been an endless source of worry and expense to the management. On account of the large percentage of sulphuric acid in the water, a boiler would not last more than ten or twelve months, with the most careful handling. During this short period it would often require three complete sets of new flues, not to mention feed nipples, piping and fittings, which were continually requiring attention.

Various methods were tried to treat the water, but nothing proved to be of any practical benefit. Matters reached such a point that the most enthusiastic vendor of boiler compounds would make a wide detour to avoid the Crown Point shaft house, and always changed the subject when it was mentioned. The property was purchased by the Colorado-California Shareholding M. & M. Co. in 1899. This company prepared to work the mine on a larger scale than heretofore, and, after losing the old plant of machinery by fire, installed a new 12x16 geared hoist and two 80 H. P. boilers. After a year's experience with the water, steam was found to be out of the question. W. H. Knowles, the manager of the company, after an inquiry into the subject, decided to employ gasoline engines as a source of motive power.

There are a number of small gasoline hoisters used in the district; but the general and popular impression has been that a large hoister of this type would not be practicable. On this account the matter received more than usual attention. Mr. Knowles required a rigid guarantee on power and fuel consumption, with the proviso that the work of erection should not interfere with the use of the steam hoister until the time came to draw the fires under the boilers and depend on the new power entirely.

A general idea of the arrangement can be obtained from the accompanying illustration. It is not intended to offer this as an ideal design for a hoisting plant, as it was a case of making the most of existing circumstances and keeping down first costs; but for economy and ease of operation it will compare very favorably with anything of the kind in use. Mr. Knowles' plan was to couple two Witte gasoline engines to the steam hoist in such a manner that either one or both gasoline engines could be used, and that either steam or gasoline, or both, could be employed for power. This was accomplished in the following manner: A countershaft supported by three bearings is geared to the engine shaft of the hoist by means of a pinion and split gear. The gasoline engines are coupled to each end of the countershaft with a friction clutch coupling. Each engine develops 40 brake H. P. at an altitude of 9000 feet, and were designed especially for the plant, a novel feature being the injection of a small amount of water with the air at each stroke. The evaporation of the water during combustion absorbs some of the heat generated, and the steam produced adds to the expansive power of the charge, the temperature being slightly reduced. Thus a high degree of compression is possible without a premature ignition, and the loss of heat in the water jackets may be reduced 10% to 15%.

The cooling water for the jackets is contained in two tanks, each holding 2000 gallons, and is kept in continuous circulation by a small rotary pump. The gasoline supply is stored outside and below the shaft house and is pumped to the engines as required, the surplus being returned to the tank.

The hoisting operations are controlled from a brake stand placed midway between the engines. One lever operates the band friction clutch on the hoist, another the brake and a third regulates the speed.

The right-hand engine is kept running at half speed when not hoisting and drives the Baker blower which ventilates the mine. When the signal to hoist is given, the engine is brought up to speed and starts the other engine. The drum clutch is then thrown in and the bucket starts. Much of the work requires but one engine.

The plant has been run continuously since first started. The connecting rods to the steam cylinders can be replaced at a moment's notice, but have not been so far, and probably never will be, as gasoline has proven far more reliable than steam in this case.

The mine is worked under two ten-hour shifts. From eighty to ninety tons of ore are hoisted during the day shift and about 160 tons of water during the night shift. Most of this work is done from the 700-foot level. The load hoisted amounts to 6500 pounds, exclusive of friction on the skids and rollers. The shaft pitches about 15° from the vertical, and makes several turns. The fuel consumption for this duty, including the 10 H. P. required twenty-four hours for running the blower, will average about fifty gallons of common gasoline in the two shifts. The cooling water consumption amounts to about sixty gallons per day. In the winter this is supplied by shoveling snow into the tanks.

The marked success of the plant is in a great measure due to the efficient way in which it has been handled by the engineer in charge, who made his first acquaintance with gasoline engines when the plant was turned over to him by the erecting engineer of

Crown Point & Virginia Gasoline Hoist, Idaho City, Colo.

the Hendrie & Bolthoff Mfg. & Supply Co. of Denver, Colo.

It is interesting to compare the relative cost of operating the steam and gasoline plants. The steam consumed 2½ tons of coal in twenty-four hours, costing $5 per ton delivered. To this was added the wages of one fireman for each shift, at $2.50 per shift, and the cost of hauling water, $10 per day, making a total daily cost of $27.50 outside of engineers' wages, which are the same for both plants. The gasoline engine requires fifty gallons of fuel per day of twenty-four hours, costing 20 cents per gallon delivered. The water costs $1.50 per day and the services of the fireman are dispensed with. The total amounts to $11.50 per day. This shows a saving of $16 in favor of the gasoline engines.

The latter have proved to be safe and reliable. The only repairs needed have been battery renewals.

This plant is being watched with great interest by mining men. In many instances the results obtained here could be greatly exceeded; but for mines where the water could not be handled by buckets alone, an installation of this kind would not be advisable.

The Dorcas Pneumatic Cyanide Mill.

Written for the MINING AND SCIENTIFIC PRESS by PROF. E. F. GROPELLO.

The Dorcas is a custom mill, especially constructed to treat ore from the Cripple Creek district of Colorado. Its capacity is 120 tons per day. The ore, as it comes from the various mines and samplers, is first passed through a rock breaker and a set of coarse rolls, whence it is elevated to the sampling room and there sampled. The average value of the ore treated is $20 per ton. From the sample room the ore is conveyed to a revolving dryer, and is next passed through two sets of finishing rolls and corresponding screens to be reduced to a 24-mesh fineness. The finished ore is then roasted in a Holthoff-Wethey furnace and conveyed therefrom to the leaching tanks.

The leaching tanks are six in number, 30′ in diameter and 4½′ high, and are fitted with the pipe arrangement used in the pneumatic cyanide process. In the beginning only one-half of these tanks were fitted for the use of the pneumatic process in order to make a thorough comparative test between this and the old method of leaching. These comparative tests showed that the old method required from ten to fifteen days for the treatment, while by the pneumatic system this was reduced more than one-half and a higher extraction was also obtained, so the remaining tanks were equipped for its use.

The air is supplied by a light-service compressor at a pressure never exceeding five pounds, about 1 cubic foot of free air per minute to each ton of ore being the amount needed to agitate and oxygenate the solution.

Five days' treatment is generally enough to get the values down to about $1 per ton, when the tank is sluiced out and the pulp concentrated on Wilfley tables. The tailings after concentration average about 40 cents per ton.

I shall not give here any description of the working of our crushing and roasting department, as there are no new features in it and it is practically the same as that of all other mills treating Cripple Creek ores, but I will specialize somewhat about the working of our cyanide department in connection with compressed air.

Our tanks are filled by means of a conveyor. As soon as the filter bottom of the tank is covered with pulp a solution standardized to ten pounds of KCy to the ton is turned on it and gauged so as to follow the pulp as this fills the tank. In this way no time is lost and all available time given to the solution to act upon the values in the ore. Once the tank is filled and covered with solution, the compressed air is gradually turned through the perforated air pipes that lie on the top of the filter bottom. Whenever the air comes up unevenly through the pulp, as it sometimes does, following the places of least resistance, this undesirable feature is avoided by placing two men with ⅝″ iron rods on the tank, who push these rods through the pulp to the filter bottom, thus opening new ways for the air to come through the pulp and thereby spreading the action of the same evenly all through the mass. This point reached, the air is kept on till the assay of the pulp shows at least a 90% extraction. About thirty hours is the time generally necessary to get such result. The air is then turned off and the pulp allowed to settle for about one hour. This time expired, percolation is started and the strong solution drawn off as quickly as possible, following it on top with a weak solution of five pounds of KCy to the ton. Percolation is kept going until the percolating solution shows only traces of gold. Then wash water is applied to displace the remaining KCy solution and leave the tank ready to be sluiced out and the pulp concentrated.

Quickness and high extractions are the special features of this way of treatment. The consumption of KCy, as compared with dead leaching, is not increased by the use of compressed air, as the stronger consumption at the beginning of the operation is compensated by the shorter time of contact of solution with the pulp, this sensibly diminishing the consumption of KCy in the second part of the treatment. Our average consumption for the months of March and April was somewhat less than one pound to the ton.

The one unique feature of our plant is the treatment of unroasted dust, collected in our baghouse and flues, a product of our dry crushing machinery. This product had been formerly sent to the smelters to be treated at high charges.

After much experimenting, the writer came to the conclusion that the mill dust could be treated by cyanide, and a very good extraction obtained, be it roasted or not. Comparative tests were made: Heads, roasted, $52; unroasted, $51.20. After treatment the tailings of both tests assayed the same, to wit, 80 cents per ton. In fact, experiment showed that, if Cripple Creek ores could be crushed fine enough, cyanide would extract the values from them without requiring a preliminary roast, thus upsetting the theory that raw sulphide and telluride ores would not yield their gold to the cyanide treatment. The actual work proved the truth of this assertion. Now, to each tank three tons of mill dust are added and spread evenly on top of the charge, and then covered with solution. The compressed air supplies the necessary agitation, and the roasted pulp the filtering medium. In this crude way an average extraction of over 92% of the values is obtained at a cost of less than $2 additional per ton, while the smelter charges for treating this material was from $12 to $15 per ton.

The Dorcas Pneumatic Cyanide Mill, Florence, Colo.

IT is only beginning to be realized by statisticians and political economists that electricity is a factor of tremendous importance in the development of countries and the peoples. The industrial supremacy of Great Britian, maintained during more than a generation, was due to steam—due to the coal fields of England and the inventive and mechanical skill of the people who utilized the gifts of Nature in the development of their industries and became the foremost manufacturing nation. This country is contesting that supremacy because of superior advantages of the same kind, but a factor of no small importance in the contest is the electrical development which has enabled it to conserve its forces and utilize its resources to the best advantage. The electrical railway alone has added an almost incalculable sum to this country's values. Electrical development of water power has harnessed the sunshine falling upon vast areas, and set it to work in the factory and shop. Electricity has freed innumerable people from manual labor to allow them better opportunities in other directions. This advance has been much more rapid than was the development of steam power that enabled the Yorkshire looms to make cloth for half the world. What its economic results will be, can not be stated, but that they will be of inestimable value to us, can not be denied.—Electrical Review.

An Atlin Hydraulic Mine.*

Written for the MINING AND SCIENTIFIC PRESS.

Exploration of Atlin placer deposits is proving that in the lines of distribution of the gold—the pay leads—there is but little difference between them and the placers of other districts. The source of the gold supply is in the eroded auriferous quartz ledges, several of which have been found in cleaning up the bedrock in the placer diggings. The gold-bearing streams, in building downward and widening the valleys in which they now flow, deposited the gold in what are now, for distinction, termed the old channel lines. In this respect they resemble stream-formed placers in Nome, the Klondike and the Cariboo district in British Columbia. The study made of the Atlin gold-bearing creeks has indicated that the upper portions of the channel are now in place, much as they were before the glacial period, but that the lower portions of the channels have been run over by glaciers, which have picked up and redeposited the gold of the old channel beds in new lines.

The ground is not frozen to the bedrock, as in the Klondike, nor does it freeze down in winter. Mining is thus followed under favorable conditions in Atlin. The hydraulic method of attack, dredgers and elevators can all be operated. The district was discovered late in August, 1898, but only during 1900 was exploitation begun on a scale commensurate with the extent and gold-bearing value of the deposits.

Pine creek was the location of the first discovery, and the upper and shallower placers have been extensively and profitably worked. The Race Horse property, operated under lease by the Pine Creek Tunnel Syndicate, is a large tract of the old channel of the lower portion of Pine creek, where the pay had been more or less changed in location by glacial movement. The exploiting company is largely a local syndicate, of which J. H. Brownlee has been the active promoter and superintendent of the work. Aside from the profit to be derived from successful exploitation, the local promoters have designed to demonstrate, by finding the gold-bearing lead, that it was continuous from the upper workings of the creek—the nearest point, Willow Creek river, being 5 miles distant—even though the bed of the present creek contained no gold. While the theory that the lead was probably continuous and could be found was perfectly comprehensible to an expert, the fact of the actual finding of the lead was needed to convince the practical men who mine. Such pioneer exploration is attended with more than ordinary risk to the money expended, and the men who took the chances are to be complimented for their business courage and congratulated on the success that so soon attended on their enterprise. The discovery has added largely to the workable area of Atlin district and makes possible a number of large operations that should have years of profitable work ahead of them.

The illustration on the front page is a view of the Atlin hoisting works at the successful prospect shaft recently sunk on the Lillian claim of the Race Horse group by the Tunnel Company. In the winter of 1899-1900 a preliminary prospect shaft was put down by hand, finding a pay streak estimated then, from prospecting, to go from $15 to $18 a cubic yard. This shaft, being untimbered, caved in at the opening of spring, and the flow of water became too great to be handled by hand.

In November last the Pine Tunnel Syndicate was organized and started to run a 1200-foot tunnel to bottom the shaft. Finding that it could not get to bedrock in that distance, the tunnel was discontinued and several shafts were attempted in its line to verify the bedrock depth; but water stopped them all. Finally, the new shaft shown in the illustration was started, with the steam hoist handling the heavy flow of water with a bucket. Bedrock was reached at 44 feet depth after twenty-four days work of three shifts. The prospects taken from bedrock gravel from this shaft tend to confirm the estimate of gold content made from the prospecting of the first shaft. The ground passed through in sinking was: Surface drift material, 12 feet; bedded silts and gravels, 9 feet; wash gravel carrying pay, 5 feet; unstratified silts and gravels carrying boulders and boulder clay, 5 feet; bedded silt deposit, 8 feet; wash gravel, containing quartz in

*See illustration front page.

abundance, coarse nugget gold, 6 feet. The bedrock is a serpentine, heavily mineralized with pyrite.

[The presence of quartz in such notable amount in the bedrock strata of wash, contrasted with its absence in the covering beds, would indicate that the channel was the original pre-glacial channel in place, rather than the result of a glacier-fed stream or a stream flowing subsequent.—ED.]

A Mine History from Correspondence.

Mine owners and superintendents twenty-five and more years ago did not keep detail records and plans of a mine's operation. The lack of them, when the expediency of reopening a mine that has been closed down for many years is under consideration, is seriously felt by the consulting engineer whose counsel may be employed. Oral testimony as to why operation was abandoned and as to the nature and condition of mine openings that cannot now be entered and examined is neither fully reliable nor sufficiently complete. Cheaper mining and treatment costs and a more complete beneficiation of the minerals in ores, if the facts regarding the old operation of the mine could be surely known, might show a possible profit margin that would justify reopening it now.

It sometimes happens that the letters of the superintendent or manager written at the mine have been preserved. As letters simply, the information they contain is mentally unassimilatable. The facts may be there but their coherence is lost. The purpose with which this is written is to illustrate a practical method of preparing a comprehensive mine history from a correspondence.

The letters employed are a portion of the correspondence of the superintendent of the Holy Terror gold mine, written to the company office in San Francisco.

August 4, 1863.

I have not cleaned up the mill yet, as I wish to crush two more days on ore coming from the upper tunnel, north of the shaft. The ore I extracted south side has not yielded what I expected. I have stopped work in it and will stop the north side to-night. I will continue the shaft on the second vein. I will run a drift 15 to 18 feet to meet the tunnel, which will permit us to take out ore through the incline and enable us to discharge the two men on the whim at the shaft. This shaft is about 80 feet deep. The vein is 2 feet wide. The quartz in the incline is still the same, 3½ feet thick.

August 6, 1863.

I ship per express 56 ounces. This quartz not having paid, I last night stopped extraction work. This week I will crush ore from the second vein.

August 10, 1863.

I yesterday stopped all work except in the incline. I cleaned up for three days' crushing 17½ ounces bullion—about $300.

September 3, 1863.

On arrival this morning I went down the incline, to see for myself. The vein is 2 feet thick. Rock is soft and allows contractors to make 8 or 9 feet per week. I was astonished at the change in the ore. It is the same quartz as at the beginning of the contract. From the 50 feet run by the contractors there are about 25 tons in the mill. To make room for that they are now taking out about 2 tons a day. I shall commence to-morrow crushing day times until Sunday. The ore looks well that is coming out now.

September 28, 1863.

The 60 feet of incline, I think, will be finished Saturday. I to-day asked bids for 30 feet more. The quartz in the incline is whiter—less sulphurets. It is 2 feet thick.

October 6, 1863.

The 60-foot incline was finished Saturday evening; the vein is 18 inches thick and streaked; it is no longer the white quartz we had. I gave the contractors another 30 feet at $28.

October 15, 1863.

The new contract for incline is down 9 feet; it is thought it will be finished by Nov. 4th. The vein at this depth is 6 inches. Another 10 feet and we will be able to contract the levels. The rock is softer. I expect to commence crushing Friday on ore from north side below the tunnel.

October 20, 1863.

In my last I stated that the vein at the bottom of the incline was 6 inches. To-day the vein has 2 feet width. The quartz, Mr. President, I only wish would continue what it is now.

October 22, 1863.

In my telegram of yesterday I announced 2 feet of quartz; to-day it is 4 feet thick, and with promising sulphurets of lead. The rock is soft. I have crushed for twenty-four hours quartz from the north side; but not having yielded up to the prospects, I have stopped. I am saving the ore from the incline.

November 1, 1863.

The vein is to-day 6 feet; the quartz is fine—that is, in the incline. I have let two contracts to run levels north and south, each 80 feet; they will start 80 feet down the incline. The contractors on the incline sinking will lay off to get them started, so all can work at once.

November 12, 1863.

The vein is still the same. Some magnificent quartz. The level north is in 8 feet, the other not so far. The contractors have commenced on the incline again.

December 1, 1863.

The contract is finished on the incline, which makes us 110 feet of ore to break down. The south level is in fine ore; the face has a 3-foot thick vein. In the incline bottom the vein is 4 feet and rich. The vein is becoming flat. I have given contract for 10 feet more of incline at $30. During the time, the contractors on the tunnels will get out nearly their 80 feet. The south end is 55 feet now. A company offer me to take out the quartz from the south level for $2 a ton to the surface. The ore will enable the mill to keep ten stamps going. I am paying $13 a foot for the north level, which is a little high. It is now out 62 feet.

December 16, 1863.

The vein is flat, but I think it will resume its dip of 75°; anyway, the ore is superior to that which we have crushed up to the present. The contractors have finished the 10 feet in the incline, and I have given them contract for 60 feet more. The quartz is 3½ feet thick. The contractor in the north level has finished 80 feet, and I have given 40 feet more; the quartz was 18 inches thick—not no rich as in the incline. On the south side the vein is 8 feet, but it is not so good.

January 4, 1864.

That what we imagined a division of the vein is a horse. The veins join below the boulder and it has there the same dip. The contractors in the incline have 22 feet now done. I am paying them $32 a foot. The vein is 7 feet thick and prospects good. In the south the vein was down to 1 inch, but is now 18 inches. The contractors will finish in three days more. I have 225 tons of ore taken out that I think will go $20 to $30.

January 10, 1864.

Nothing new to report, the mine is the same as in my last letter. The level in the north advances faster than in the south. The vein is in the north only 3 inches now. The contractors have 28 feet completed.

January 15, 1864.

The vein in the north is now 16 inches and is good ore. In the south the ore is not so good, $10 to $15 I think. The new contractors in the south have 10 feet done.

January 22, 1864.

Have crushed five tons for the Razzle Company and ten for the Excelsior. It cost us to do it $8 a ton, which they paid me. Had I been able to have the level north driven cheaper than $11 a foot I would not have contracted for that price. The men say they cannot make wages at it and want to give it up. The quartz in the incline looks fine; the contractors are now down 37 feet. I think it will be well to have some more levels soon. Will commence crushing the ore we have now.

February 2, 1864.

Have been crushing now for one week and the plates give us good returns. In the south we have good ore. It is 3 feet thick. The contractors have now 43 feet done.

February 20, 1864.

I finished crushing and ship you 270 ounces of bullion. There was in all nearly 400 tons of quartz. You will see it does not pay us to take all the quartz. The contractors finished the contract on the incline, and I have given them a contract at $12 to run a second level on the south from 160 feet in the incline. The north level is 133 feet long.

The letters were given to a typewriter copyist with instructions to rewrite them, separating into paragraphs relating to every separate opening in the mine. Where matter was in the letters not relative to a mine opening it was paragraphed separately. These are omitted below as unessential, and the result of the paragraphing appears as follows:

Aug. 4, '63: I have not cleaned up the mill yet, as I wish to crush two days more on ore coming from the upper tunnel, north of the shaft.
Aug. 4, '63: The ore I extracted south side [upper tunnel] has not yielded what I expected. I have stopped work in it.
Aug. 4, '63: Will stop the north side [upper tunnel] to-night.
Aug. 4, '63: I will continue the shaft on the second vein.
Aug. 4, '63: I will run a drift 15 to 18 feet to meet the tunnel, which will permit us to take out ore through the incline.
Aug. 4, '63: This shaft is about 80 feet deep. The vein is 2 feet wide.
Aug. 4, '63: The quartz in the incline is still the same, 3½ feet thick.
Aug. 6, '63: I ship per express 56 ounces. This quartz not having paid, I last night stopped extraction work.
Aug. 6, '63: This week I will crush ore from the second vein.
Aug. 10, '63: I cleaned up for three days' crushing 17½ ounces bullion—about $300.
Sept. 3, '63: The vein [in incline] is 2 feet thick. Rock is soft and allows contractors to make 8 or 9 feet per week. It is the same quartz as at the beginning of the contract. From the 50 feet run by the contractors there are about 25 tons in the mill. They are now taking out about 2 tons a day. The ore looks well that is coming out now.
Sept. 28, '63: The 60 feet of incline, I think, will be finished Saturday. I to-day asked bids for 30 feet more. The quartz in the incline is whiter—less sulphurets. It is 2 feet thick.
Oct. 6, '63: The 60-foot incline was finished Saturday evening. The vein is 18 inches thick and streaked. It is no longer the white quartz we had. I gave the contractors another 30 feet at $28.
Oct. 15, '63: The new contract for incline is down 9 feet. It is thought it will be finished by Nov. 4th. The vein at this depth is 6 inches. Another 10 feet and we will be able to contract the levels. The rock is softer.
Oct. 20, '63: In my last I stated that the vein at the bottom of the incline was 6 inches. To-day the vein has 2 feet width. The quartz, Mr. President, I only wish would continue what it is now.
Oct. 22, '63: In my telegram of yesterday I announced 2 feet of quartz. To-day it is 4 feet thick, and with promising sulphurets of lead. The rock is soft.
Oct. 22, '63: I have crushed for twenty-four hours quartz from the north side; but not having yielded up to the prospects, I have stopped.
Oct. 22, '63: I am saving the ore from the incline.
Nov. 1, '63: The vein is to-day 6 feet. The quartz is fine—that is, in the incline.
Nov. 1, '63: I have let two contracts to run levels north and south, each 80 feet. They will start 80 feet down the incline.
Nov. 12, '63: The vein is still the same. Some magnificent quartz. The level [80-foot] north is in 8 feet.
Nov. 12, '63: The other [80-foot] not so far.
Nov. 12, '63: The contractors have commenced on the incline again.
Dec. 1, '63: The contract is finished on the incline, which makes us 110 feet of ore to break down.
Dec. 1, '63: The south level is in fine ore; the face has a 3-foot thick vein.
Dec. 1, '63: In the incline bottom the vein is 4 feet and rich. The vein is becoming flat. I have given contract for 10 feet more of incline at $30.
Dec. 1, '63: The south end is 55 feet now. A company offer me to take out the quartz from the south level for $2 a ton to the surface. The ore will enable the mill to keep ten stamps going.
Dec. 1, '63: I am paying $13 a foot for the north level, which is a little high. It is now out 62 feet.
Dec. 16, '63: The vein is flat, but I think it will resume its dip of 75°; anyway, the ore is superior to that which we have crushed up to the present. The contractors have finished the 10 feet in the incline, and I have given them contract for 60 feet more. The quartz is 3½ feet thick.
Dec. 16, '63: The contractor in the north level has finished 80 feet, and I have given 40 feet more; the quartz was 18 inches thick—not so rich as in the incline.
Dec. 16, '63: On the [80-foot level] south side the vein is 8 feet, but it is not so good.
Jan. 4, '64: That what we imagined a division of the vein is a horse. The veins join below the boulder and it has there the same dip. The contractors in the incline have 22 feet now done. I am paying them $32 a foot. The vein is 7 feet thick and prospects good.
Jan. 4, '64: In the [80-foot level] south the vein was down to 1 inch but is now 18 inches. The contractors will finish in three days more.
Jan. 4, '64: I have 225 tons of ore taken out that I think will go $20 to $30.
Jan. 10, '64: The [80-foot] level in the north advances faster than in the south. The vein is in the north only 3 inches now. The contractors have 28 feet completed.
Jan. 15, '64: The vein in the [80-foot level] north is now 16 inches and is good ore.
Jan. 15, '64: In the [80-foot level] south the ore is not so good, $10 to $15 I think. The new contractors in the south have 10 feet done.
Jan. 22, '64: Have crushed five tons for the Razzle Company and ten for the Excelsior. It cost us to do it $8 a ton, which they paid me.
Jan. 22, '64: Had I been able to have the [80-foot] level north driven cheaper than $11 a foot I would not have contracted for that price. The men say they cannot make wages at it and want to give it up.
Jan. 22, '64: The quartz in the incline looks fine; the contractors are now down 37 feet.
Feb. 2, '64: Have been crushing now for one week, and the plates give us good returns.
Feb. 2, '64: In the [80-foot level] south we have good ore. It is 3 feet thick. The contractors have now 43 feet done.
Feb. 20, '64: I finished crushing and ship you 270 ounces of bullion. There was in all nearly 400 tons of quartz. You will see it does not pay us to take all the quartz.
Feb. 20, '64: The contractors finished the contract on the incline.
Feb. 20, '64: I have given them a contract at $12 to run a second level on the south from 160 feet in the incline.
Feb. 20, '64: The north [80-foot] level is 133 feet long.

The matter prepared by the typewriter in paragraphs is then scissored and the paragraphs taken separately, each with its date, are pasted in the order of the dates under headings designating the several mine openings, shafts, inclines, levels, the mill, etc. Where this is completed the material of the letters is in the following form. It will be noted that words or phrases have been introduced by the typewriter in brackets to make each paragraph clear and intelligible when removed from its context in the letters:

MILL.

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Aug. 6, '63: I ship per express 56 ounces. This quartz not having paid, I last night stopped extraction work.
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Feb. 2, '64: Have been crushing now for one week, and the plates give us good returns.
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Feb. 20, '64: I finished crushing and ship you 270 ounces of bullion. There was in all nearly 400 tons of quartz. You will see it does not pay us to take all the quartz.

UPPER TUNNEL NORTH OF SHAFT.

Aug. 4, '63: Will stop the north side [upper tunnel] to-night.

UPPER TUNNEL SOUTH OF SHAFT.

Aug. 4, '63: The ore I extracted south side [upper

tunnel] has not yielded what I expected. I have stopped work in it.

SECOND VEIN.

Aug. 4, '63: I will continue the shaft on the second vein.
Aug. 4, '63: This shaft is about 80 feet deep. The vein is 2 feet wide.
Aug. 6, '63: This week I will crush ore from the second vein.
Aug. 10, '63: I cleaned up for three days' crushing 17½ ounces bullion—about $300.

DRIFT A.

Aug. 4, '63: I will run a drift 15 to 18 feet to meet the tunnel, which will permit us to take out ore through the incline.

INCLINE NO. 1.

Aug. 4, '63: The quartz in the incline is still the same, 3½ feet thick.
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Feb. 20, '64: The contractors finished the contract on the incline.

80-FOOT LEVEL NORTH.

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Jan. 22, '64: Had I been able to have the [80-foot] level north driven cheaper than $11 a foot, I would not have contracted for that price. The men say they cannot make wages at it and want to give it up.
Feb. 20, '64: The north [80-foot] level is 133 feet long.

80-FOOT LEVEL SOUTH.

Nov. 1, '63: [Contract let for 80 feet.]
Nov. 12, '63: The other [80-foot] not so far [as 8 feet.]
Dec. 1, '63: The south level is in fine ore. The face has a 3-foot thick vein.
Dec. 1, '83: The south end is 55 feet now. A company offer me to take out the quartz from the south level for $2 a ton to the surface. The ore will enable the mill to keep ten stamps going.
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Feb. 2, '64: In the [80-foot level] south we have good ore. It is 3 feet thick. The contractors have now 43 feet done.

160-FOOT LEVEL SOUTH.

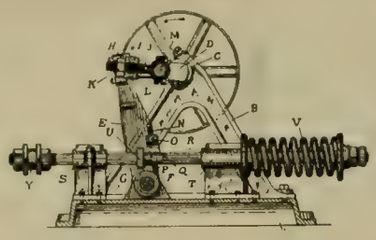
Feb. 20, '64: I have given them a contract at $12 to run a second level on the south from 160 feet in the incline.

Mining and Metallurgical Patents.

Patents Issued April 30, 1901.

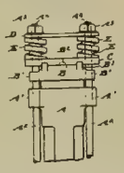
Specially Prepared for the MINING AND SCIENTIFIC PRESS

DRIVE MECHANISM FOR ORE CONCENTRATORS.—No. 673,058; M. S. Leve, Fruitvale, Cal.



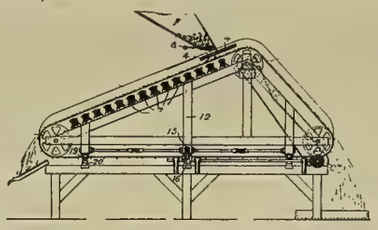
The combination of crank shaft, connecting rod of a length ranging from about two and one-half times down to one and one-quarter times the length of crank, a lever driven by connecting rod, an adjusting block carried by lever and adapted to be set nearer or closer to the fulcrum of lever, and means acted upon by adjusting block to transmit the motion of the lever to the mechanism to be operated.

ROCK DRILL.—No. 673,104; W. Wood, Paterson, N. J.



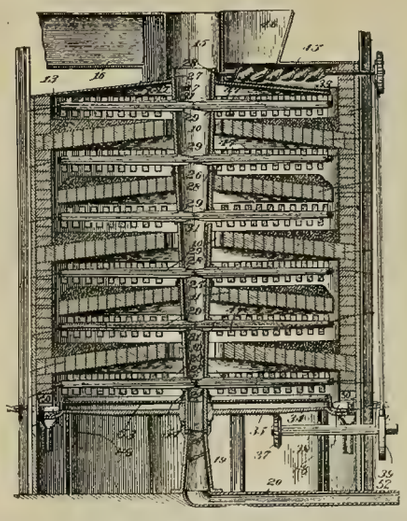
The cylinder A and guide lugs A′ A′ thereon, top head B and its guide lugs B′ B′, the boss B^2 and holding lugs B^3 on head, in combination with the cross piece C matching between holding lugs and having recess c receiving boss, and holes C′ C′, side rods A^2 A^2 extending through guide lugs and holes, spring plate D, springs e e and holding nuts A^3 A^3.

MAGNETIC SEPARATOR.—No. 673,172; R. McKnight, New York, N. Y.



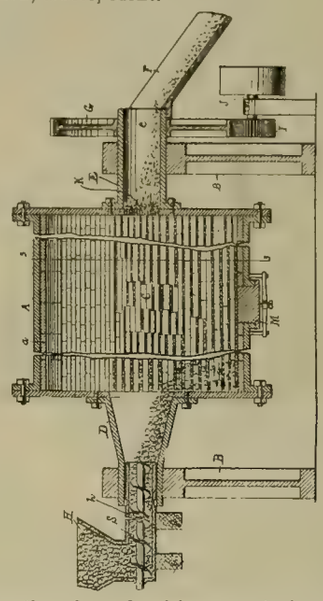
Combination of an upwardly traveling belt presenting an extended inclined surface provided with a series of projections of magnetizable material, ore and water feeds for the material near the top of the inclined portion of the belt and means for magnetizing the projections, said belt being adapted to subject the material to a prolonged washing operation, the projections being adapted to create eddies in the downflowing current and attract the magnetic portions of the ore, carrying them over the upper end of the incline.

FURNACE FOR ROASTING ORES.—No. 673,174; A. P. O'Brien, Richmond, Va.



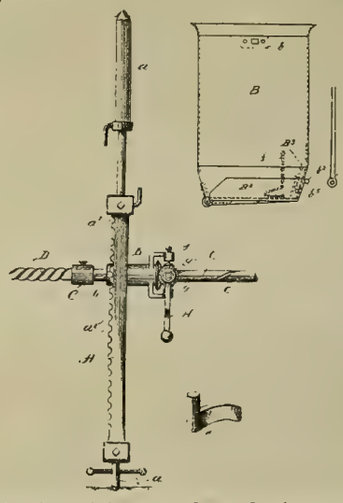
Combination of hollow, downwardly tapering, central shaft, revolubly supported and provided with diametrically opposite, tapering sockets or apertures opening into the central cavity of shaft, raker arms having tapered heads fitted into sockets and abutting at inner ends within cavity of hollow shaft, means for passing a cooling agent through shaft, whereby shaft and abutting ends may be kept cool and means for holding raker arms in position, the construction being such that shaft and arms may be readily removed from or inserted within furnace.

APPARATUS FOR PULVERIZING ORES.—No. 673,195; J. K. Clark, Butte, Mont.



Combination of a pulverizing receptacle, means for agitating it, free comminuting devices presenting plane surfaces which are adapted during motion of cylinder to come into grinding coaction, an inlet to receptacle for feeding ore below level of comminuting devices and an outlet for comminuted ore at a higher level than the immediate entrance of coarse ore to drum, whereby discharge of the comminuted ore is effected by upward displacement of coarse ore introduced.

COAL DRILL.—No. 673,205; M. Hardsogg, Ottumwa, Iowa.



Combination of box or sleeve having smooth interior or bore and provided at one end with arms, a drill feed shaft passing through box or sleeve and between arms, a longitudinal groove in exterior of shaft, a spiral groove in exterior of shaft, narrow in cross section and wide-spaced apart with body of the shaft for wide spaces between spiral of full diameter, leaving exterior of shaft practically smooth to slide in smooth interior or bore of box or sleeve, a driving gear on shaft journaled in end of box or sleeve and engaging with longitudinal groove of shaft for rotating shaft, a feeding gear mounted on shaft within driving gear and engaging with spiral groove of shaft for advancing and receding shaft according to direction of rotation of gear, a collar or sleeve on shaft carried by arms of box or sleeve, a spindle on collar or sleeve, bevel gears connected together and nested one within the other and engaging driving and feeding gears and rotatable on the spindle of the collar or sleeve, and a hub for one of gears having a rectangular exterior to receive a handle for rotating the gears.

HOISTING BUCKET.—No. 673,060; T. J. Pratt, Paterson, N. J.

A bucket having four walls, an automatically closing spring-actuated bottom having upturned sides, forming a shoot through which contents of bucket may be delivered, and a locking mechanism to keep bottom closed when desired.

MINING SUMMARY.

Specially compiled and reported for the MINING AND SCIENTIFIC PRESS.

ALASKA.

The Atlin M. Co.'s hydraulic plant has been delivered at McKee creek, Atlin, and the flume is being constructed. Fifteen men are now employed on the work, and R. D. Featherstonhaugh, the Supt., says he expects to start piping on June 1.

The floor space of the Treadwell mine machine shop is to be increased, larger coal bunkers are to be placed and the wharf doubled—all during the summer.

The Kuskokwin gold fields in Alaska are reported to be valueless, and prospectors who rushed in on false reports are now stated to be struggling back to the older camps from whence they came.

The discovery of another line of pay is reported in El Dorado creek, in the Klondike. It seems the first workings on what was supposed to be bedrock at 30 feet of depth are in reality on an upper lead or stratum of pay. On continuing the sinking, a depth of 60 feet has been reached without getting bedrock. The bed of the upper wash was a tough blue clay. Under this came boulders, and then a light clay, in which the gold is found. The latter is nuggety, well washed, and pans run high. While the discovery is of consequence, it is probably only local, and does not necessarily open up anything extensive.

ARIZONA.

MARICOPA COUNTY.

The Keystone C. & G. M. Co., J. M. Evans manager, Phœnix, are developing a copper property in the Black Rock mining district, near Wickenburg. It is expected deposits of copper of sulphides will be uncovered in lenticular bodies or on fault fissures. About 1000 feet of development has been done in the surface ores and to a depth of 400 feet. To accomplish drifting planned an air compressor of 54 H. P. will be installed. They also propose the early construction of a furnace for experimental work. The superintendent estimates that the ore may be treated at a cost of not less than $4 per ton. The ores concentrate about six into one and the average values are great enough to assure good returns when the smelter is erected.

CALIFORNIA.

AMADOR COUNTY.

At the Oneida mine, Sutter Creek, says Supt. Derby, ore is being produced from the 1500 level, enough being taken out to keep the sixty stamps supplied. Drifting is being done on the 1200-foot level—the bottom of the old works.

BUTTE COUNTY.

It is said that the Boston & Oroville Co., which is building a dredger in South Thermalito, has bought a controlling interest in the Continental Dredge Co., working on Lower Montgomery street, Oroville. The company owns 600 acres and the Continental holdings are 125 acres. W. P. Hammon is local manager for the company.

Two drilling machines have lately arrived at Oroville to be used on the Feather river bottom lands. There will then be five of these prospecting outfits at work near Oroville.

A. B. Chambers, Supt. Bloomer Hill mine, Lumpkin, says a tramway will not be built over the hill from the mine to the mill, but a 400-foot tunnel is being put through the hill instead.

CALAVERAS COUNTY.

On the Emma mine, Campo Seco, McSorley Bros. owners, the double compartment shaft is down 100 feet. The ledge shows a black slate gouge and quartz seams, all prospecting in free gold and carrying high-grade sulphurets. The owners have bought 160 acres of land to the south of the mine, through which the vein extends.——The Birdena mine, W. W. Weatherwax Supt., has the shaft down 205 feet, and is beginning crosscutting.

F. Dunlap, Pres. Oriole M. Co., operating at Angels Camp, states that preparatory work for the erection of a 20-stamp mill will commence at once. The depth of the shaft is now 550 feet. W. E. Everson is Supt.

EL DORADO COUNTY.

The Minnehaha mine has been bonded by A. J. Frochlich of Auburn, Placer county.

R. K. Claibourne says he and his partner have spent the winter in running a tunnel to tap the ledge on the Extra mine at Grizzly.

The 5-stamp mill of the St. Clair mine, Placerville, B. Peters Supt., is running steadily on ore from the 100-foot level.

INYO COUNTY.

Work is to be resumed in the Poleta mine, Independence, A. Farrington manager. G. Cowser has contracted to sink 100 feet and two shifts will be put on.

KERN COUNTY.

The Butte Lode Co., at Randsburg, has milled thirty-four tons at the Red Dog mill, obtaining $3950, an average of $116 per ton. A new gasoline hoist has been installed and a new ore bin and track built.

Work is to be resumed on the Argus Butte mine, near Randsburg, owned by John Rosenfelt Sons, of San Francisco, G. Lewis, superintendent. There is a mill on the mine, but the ore is refractory and has been sent to a smelter, but the cost of transportation is heavy.

NEVADA COUNTY.

The new 10-stamp mill of the Lecompton mine at Grass Valley has been started up. J. M. Kitts is in charge.——Work in the Yuba mine at Maybert has been temporarily suspended by the breaking of the flume furnishing the water power. It will be repaired immediately.

PLACER COUNTY.

At the Eureka mine, on the Forest Hill Divide, 22 feet of good-looking gravel with quartz boulders has been found on a bench on the west rim of the channel. The drift pushed northeasterly has been run 131 feet without reaching bedrock in the channel.

SHASTA COUNTY.

It is reported that rights of way have been secured and a contract for power from the Shasta Electric Power Co. entered into by parties closely connected with the Southern Pacific Co., who propose to construct a standard gauge electric railroad from Kennett to the Bully Hill copper matte smelter, letting contracts for construction within the next three months.

The Mullen and Poorman gold quartz claims, in Lower Springs district, near Redding, have been bonded by J. Pfeffer to M. J. Graham of Montana at $5000, on the condition of continuous work for eight months.

SIERRA COUNTY.

H. H. Brown and H. G. Read have leased the Rising Sun mine, Alleghany, and are repairing the tunnel.

It is said that a rich strike has been made in the Osceola mine at Alleghany, $10,000 being claimed to have been taken out in a sixty-hour run with a 2-stamp mill. The rich ore body was struck in a stope some 400 feet from the mouth of the tunnel. The ledge is 2 feet in width and every piece of ore from the pocket shows free gold.

SISKIYOU COUNTY.

The difficulties between the owners of the Bluejay mine, near Henley, are said to have been adjusted. A new company, the Cleve G. M. & M. Co., has been organized, in which Will & Billings are the principal stockholders, and has taken over Mr. Pool's interest.

The Jillson mine of the Hazel G. M. Co., near Henley, continues to be an excellent paying gold proposition. It is said to have yielded well towards $1,000,000 since it was opened a few years since.

A mammoth dredger is being constructed on the South Fork of Scott river, near Callahans, by the Pittsburg Co. The lumber, timbers and machinery will be teamed in from Gazelle.

TRINITY COUNTY.

Davis & Gilzean discovered a placer mine on Canon creek near Junction City last December, and have put a tunnel in 50 feet in rich pay gravel. A second tunnel from the other side of the hill has struck pay gravel of the same character. Pan prospects have run from $4 to $10 to the pan. The greatest single piece of gold picked up on the bedrock weighed $15.92. Near the point of discovery six partly filled flour sacks of gravel yielded $19.35. From another place eighteen sacks of dirt yielded $15. In five days the two took out twenty-six ounces of gold. They have not worked the mine extensively on account of lack of water.

TUOLUMNE COUNTY.

Operations on the Mapes mine, Yankee Hill, near Sonora, will soon commence, W. E. Coul Supt. The Mapes claim is situated above the Dondero claim, and, besides the gravel placer, contains several quartz ledges.

YUBA COUNTY.

The Miller quartz mine at New York Flat, near Forbestown, has been bought by San Jose people and is to be developed. A contract has been let to run a drain tunnel.

COLORADO.

J. A. Fullerton and J. B. Grove, formerly connected with the Colorado-Philadelphia Reduction Works, propose building a mill to have 400 tons daily capacity and estimated to cost $550,000. The money has been subscribed, it is stated, by London and New York people. A new process will be employed instead of the cyanide.

ARAPAHOE COUNTY.

The deposit of gold with the U. S. Branch Mint at Denver is steady; comparing, as follows, for 1900:

January	$1,567,368 58
February	1,349,673 74
March	1,572,039 43
April	1,352,454 79
Total	$5,841,536 54

1901.

January	$1,406,081 97
February	1,343,480 44
March	1,516,189 57
April	1,629,230 55
Total	$5,894,982 53
Gain for 1901	$53,445 99

BOULDER COUNTY.

The Melvina mine of Wall Street camp, Boulder, has received from the Denver S. & R. Co. some remarkable values for four cars of ore recently shipped. One lot of 3255 pounds netted $398.20; one lot of 1702 pounds netted $500.85; one lot of 143 pounds netted $581.20, and one lot of 53½ pounds netted $1072.90. It will be seen that the rich ore ran $20.04 per pound and the next grade $4.07 per pound, while the lowest grade ran nearly $200 per ton. The total received was $4938.30. The shipments represented the work of twenty men, and expenses were $1650, leaving a net profit of $3250 for one month.

GUNNISON COUNTY.

R. W. Spensley, general manager of the Dora M. Co., has gone from Gunnison into Union Park with supplies to commence early work on the Union Park placers. During the season last year several miles of ditch and flume were built to bring water to the ground. This season the ground will be washed.

The Taylor Park M. Co., near Gunnison, in the Tin Cup district, is expected to do extensive placer mining this season. This is a Boston enterprise, with T. T. Goodale, as manager. The company also owns the enterprise mine, near Dorchester, which has been equipped with $15,000 worth of machinery.

HINSDALE COUNTY.

The Ute and Ulay mines, near Lake City, have been bought by a Colorado company, of which S. D. Nicholson and J. Rodman of Leadville are the principals. The property has been developed, the shaft in the Ulay now being 1300 feet deep. A 200-ton concentrating plant has been erected and a tramway connecting the Ute with the mill. The new owners expect to expend $75,000 or $100,000 in further development.

LAKE COUNTY.

The Yankee Doodle mine, C. Spencer, Supt., operated by a leasing company composed of miners and business men of Leadville, has had its machinery plant destroyed by fire. The property was in dividend form, shipping forty tons of ore daily, which netted the lessees between $3 and $4 per ton. The plant will be rebuilt.

PARK COUNTY.

Ore running $500 per ton has been struck in the London mine, near Alma, the streak averaging from 8 inches to 2 feet in width. J. Kuhn is leasing the mine.——The Champagne Fanny, worked under lease by Mints & Schumaker, has developed a small mineral streak from 3 to 4 inches wide, assaying 781 ounces silver and 3.6 ounces gold.

PITKIN COUNTY.

A rich strike has been made in the tenth level of the Mollie Gibson mine, Aspen. Returns show from 150 to 600 ounces in silver. It is claimed that the ore shoot extends to the surface, a distance of 1000 feet.

SAN JUAN COUNTY.

Milwaukee people, headed by A. Blatz and J. C. Koch, have bought the Alta group in Gold King basin, near Telluride, for $175,000 cash. It is understood that the purchasers will operate the group with the Bessie mine, already owned by them. The Bessie main tunnel will cut the main veins of the group at great depth.

TELLER COUNTY.

The Pike's Peak power plant has started operations and is furnishing light to the buildings and mines of the Woods Investment Co. in Victor.

The company owning the Moose and Victor has resumed sinking below 1000 feet. The company believes that it will improve its chances with depth and will sink to 1500 feet.

A tunnel to drain to great depth the Cripple Creek mines is projected. The enterprise is promoted by Engineer L. H. Von Ruecau and his associates, who state that sufficient capital has been interested to insure the construction. The promoters ask for the agreement of the mine owners to pay a royalty when it shall have been demonstrated that the tunnel will drain their property. The tunnel will be between 5 and 6 miles long, with the portal at Four-mile, between Wilson and Cripple Creek, and it will cut under the apex of Bull hill at a depth of 3700 feet. Laterals will tap all the important sections of the district. The project is estimated to cost about $5,000,000.

IDAHO.

BEAR LAKE COUNTY.

The shareholders of the Bear Lake C. M. Co., owning the Humming Bird group at Paris, have elected A. H. Tarbet president and W. G. Benham secretary. It was decided at the meeting to begin active work under the management of President Tarbet.

BLAINE COUNTY.

Ore has been struck on the 360-foot level, north, in the Minnie Moore mine at Hailey. It is mostly concentrating ore, but some is first-class. The operators hope to ship a carload a day from it.

IDAHO COUNTY.

Placer season is backward three weeks later in beginning than in 1900.——Idaho Development Co. of Lewiston is putting in supplies preparatory to opening an old channel lying between Newsome and Leggett creeks. A 5-mile ditch is planned.——J Turner has a ditch on an old channel near Newsome and is preparing to hydraulic.——It is reported that the Ajax mine at Dixie, owned by Finch & Campbell of Spokane, is looking finely, with the shaft down 300 feet and drifts showing several hundred feet of shoot, with a 12 to 18-foot vein.——A strike is reported on the 200-foot level of the Vesuvius at Buffalo Hump.

Newsome, April 25.

H. T. Wright has bought the Last Chance and Pomeroy mines at Atlanta for about $15,000. It is expected to begin work at once.

KOOTENAI COUNTY.

The August and Sunset copper claims, near Old Mission, have been bonded for a short time by Butte people, who propose to develop them this summer.

G. W. Runkle says the Lolo Pioneer G. M. Co.'s properties in the Musselshell district are working twenty-two men. S. Grant, one of the principal stockholders, is expected from Detroit, Mich., to examine the property to determine whether or not a 20-stamp mill shall be put on this summer.

LINCOLN COUNTY.

Two companies—the Sweetser & Burroughs and Yale—are said to be making a great success with their dredging boats on Snake river, below Minidoka. The two boats employ about seventy men.

OWYHEE COUNTY.

The Poorman mine, Silver City, F. A. W. Gerling Supt., has sixteen men at work on the 350-foot level of the Belle Peck winze, 2000 feet in the tunnel.

On account of influx of water at Trook & Jennings mine, bonded to Norton, Irwin & Matterson, work in the shaft has been shut down and the level south on the vein is being run.

SHOSHONE COUNTY.

It is said the Gold Hunter M. & S. Co.'s mines at Wallace have been sold to J. Murray of Butte, Mont.

MICHIGAN.

HOUGHTON COUNTY.

It is reported that the Osceola copper mine is preparing to increase its output from 12,000,000 pounds to 20,000,000 pounds per annum, and at a very much reduced cost per pound.

MONTANA.

BEAVERHEAD COUNTY.

G. W. French of Dillon and A. French of Argenta have bonded the Gold Finch and Dolphin mines, in the Argenta district, to W. H. Remington of Tacoma, Wash., for $20,000. The two mines are gold bearing and have been developed by shafts. It is said the intending purchaser will build hoisting works.

FERGUS COUNTY.

The Great Northern M. & D. Co., at Gilt Edge, has been operating the Chicadee group about three years and has a cyanide plant reducing 4500 tons monthly. Over 100,000 tons of ore have already been milled and the company estimates 600,000 tons blocked out.

The cyanide plant of the Central Montana Mines Co., in Whiskey gulch in the Judith range, has been running at half capacity for two months owing to shortage of water. Treating 100 tons of ore daily the production is said to be $13,000 monthly.

The New Year Gold Mines Co., at New Year, is preparing to operate a bucket tramway from mines to mill, 1 mile apart. The ore exposed was too low grade to

stand the cost of wagon transportation, but with the tramway the new cyanide plant will be able to treat the great bodies of low-grade gold ores. The tunnel is now in over 1000 feet and cuts into the lime-porphyry contact. Drifting along the contact is being prosecuted steadily.

Finch & Campbell of Spokane, who have the Kendall mines in the North Moccasin mountains bonded, have leased from O. Stephens a water power of Warm Spring creek on the ranch of the latter. A pumping plant will be installed at once and part of the water is to be piped 5 miles to the mines to be used in the cyanide plant. The lessees are said to propose the putting up of an electric power plant to generate power for their own mill and for other cyanide plants now under construction in the district.

Lewiston, Montana, April 27.

LEWIS AND CLARKE COUNTY.

The East Helena smelter has been closed down for an indefinite period. The closing down will cause many of the lead mines to shut down, and the concentrators will also shut down, because they cannot sell the concentrates. It is probable that the closing will affect the plans for the building of the new Missouri river dam at Stubbs' Ferry.

The Robinson G. M. Co. is beginning work on Bear gulch, constructing a water power plant. On its completion work will begin in both mine and mill.

The Imperial Montana M. Co. has sent men to the Blackfeet ceded strip to open the road to its mines.

The Uncle Sam mine, near Helena, has shut down, owing to the breaking down of the old mill. A new mill will be put in.

It is said that C. E. Damours will take up the bond on the Kearsarge mine at Summit and that a mill will be erected.

MADISON COUNTY.

G. Salisbury and R. R. Smith of Grand Forks, North Dakota, have become interested in the General Shafter mine at Summit. It is said they will put in a 5-stamp mill and a cyanide plant at once.

PARK COUNTY.

The Standard M. Co. at Livingston are preparing to construct a stamp mill and are putting other machinery on their mines. C. R. Murdock is Supt.

NEVADA.

ELKO COUNTY.

C. E. Woodward and W. J. Eastman are reported to have received $5000 from the Montana Co., Ltd., of Marysville, Mont., for the Hidden Treasure mine, at Bull Run, upon which the option was given some time ago.

The Ely M. Co., at Ely, has taken out $7000 from about 900 tons of ore.

ESMERALDA COUNTY.

Leasers at Tonopah every 100 or 200 feet apart on the ledge are stoping out the ore from the surface all the way down to 50 feet. gutting the mines for a quick crop, and taking out the roof. The sale for $350,000 is reported off, it is said, over difficulties relating to the lease and town site.

STOREY COUNTY.

The mill at the mouth of Sutro tunnel is working on rock from the waste dump, which returns less than $3 per ton.

WASHOE COUNTY.

W. C. Williams, a miner of Olinghouse, has cleaned up $2691.10 from seventy-one tons of ore worked at the Slip mill. Eight men are employed at his mine.

S. Francovich, L. D. Piazza and A. Dondero have milled eighty-six tons of ore from the Cabin No. 2 claim at Olinghouse, from which they cleaned up $6000.

OREGON.

DOUGLAS COUNTY.

Jansen & Monroe, who have been placer mining on Canyon creek, say that the claim produced an average of $5 a day to the man. Of twenty acres, not one acre has yet been completely washed, but $22,000 has been taken out. The gold is coarse.

GRANT COUNTY.

The Gold Bug-Grizzly at Sumpter, operated by J. J. Hennessey and J. Helberg of Spokane, is to have a new plant. The machinery has been ordered, which will include a 50 H. P. hoist with a boiler and a large sinking pump. The property is said to have a promising quartz showing.

JOSEPHINE COUNTY.

At the Braden mine, Gold Hill, lumber is being delivered for an additional five stamps to be added to the 10-stamp mill, and concentrators have been ordered. Ultimately a 60-ton per day capacity cyanide plant will be put on. C. Ray is manager.

The sale of the J. W. Thomason quartz mine, near Placer, to J. Lewis and W. P. Gilkeson of Seattle is announced. They will put men at work to continue development.

It is reported that the smelter on the Strong group, near Waldo, is to be started soon, and that 100 men will be employed. All the supplies for the works are on the ground. The owner of this group is T. W. M. Draper of San Francisco.

The Granite Hill mine, near Grants Pass, is owned by J. O. Booth and C. L. Mangum. The vein is in granite and the ore free milling. There is considerable development, consisting of 250 feet of tunnel on the ledge, a shaft down 160 feet, and a 5-stamp mill.

Operations have been resumed at the Eureka mine at Selma. A. T. Nelson is superintendent.

The "Roaring Gimlet" quartz mine is located near Gold Hill and is operated by Sanburn, Sutton & Rease. The ore taken out is said to be full of gold.

LANE COUNTY.

Graber Bros. & Zinaker, at Bohemia, in their 350-foot level, struck a 2-inch wide rich lead, said to be lined with gold.——Harlow & Stocks have cut their vein 50 feet deeper, and find it rich as above.——Sears & Whipple, have caught the ledge in a tunnel at a depth of 150 feet. The vein is 4 feet wide and prospects free gold.

SOUTH DAKOTA.

CUSTER COUNTY.

The shaft of the Mayflower mine, operated under bond by F. C. N. Graydon of Custer, is down 200 feet. The vein is 4 feet wide and now carries bismuth and tellurium associated with the gold.——The Newark vertical shaft has cut a blind vein, said to be very rich.——At the North Star the vein in the 300 level is said to be 7 feet wide and good ore.——The Clara Belle, near Custer, owned by F. Herbert, is said to be producing rich ore. A company is projected to operate this mine and build a mill.——A strike is reported in the University group on Spring creek of nearly solid pyrites assaying $60 a ton. C. R. W.

Custer, S. D., May 5.

UTAH.

WASHINGTON COUNTY.

The New Haven syndicate, purchasers of the Dixie mine and smelter at St. George, have made another payment of $25,000, increasing the total paid to $100,000, with an equal amount still payable before the deeds are released.

JUAB COUNTY.

The site for the Centennial-Eureka Co.'s $300,000 smelter at Eureka has been selected and B. Holden, managing director, said breaking of ground would commence in a short time, as the plans prepared by G. K. Fisher are with the company at Boston.

Supt. Guenther of the Yankee at Tintic reports the ore body as increasing in size. C. Ford has contracted to build a 300-ton ore bin. A wagon road 1000 feet long, to connect the ore bin with the main wagon road, has been commenced.

In the Tesora at Tintic a strike at a depth of 375 feet has opened up a blind vein parallel with that of the main vein. It was made in a crosscut to the west 13 feet distant from the original. The mill will be completed and in operation by June 15th.

In the West Morning Glory shaft, at Tintic, a flow of water has compelled the temporary suspension of work. It is expected that arrangements will be made for a pump and steam hoisting plant, as the intention is to continue sinking below the water level before crosscutting again.

The Alice M. Co. has incorporated to operate a group of five claims in Tintic district, capital $30,000: G. C. Lambert is president and H. B. Cole is secretary and treasurer.

PIUTE COUNTY.

The Sevier Con. M. Co., R. B. Parker president, operating on Gold mountain, have bought the Kanosh claim from C. C. Crane. With this the company obtains 65 acres in the heart of the gold-bearing zone and work begins upon ore from the start. The comprny has no mill as yet.

SALT LAKE COUNTY.

The semi-annual report of the Highland Boy M. Co., which begins with July 1 and ends December 31, 1900, states:

Sales of gold	$ 88,373
Sales of silver	33,378
Sales of copper	411,931
Total	$533,683
Less freight, commissions, etc	50,754
Balance	$482,928
Lead ore sales	1,261
Total	$484,190
Mining, development and smelting expenses	233,987
Expenses at New York	14,724
Interest	1,734
Net income	$271,151

The earnings were derived from 40,103 tons of ore that were treated during the half year, or an average of less than 225 tons a day. The smelter capacity has since been doubled and the average treatment now is over 500 tons daily.

SUMMIT COUNTY.

The Daly-West of Park City produced in April 2600 tons of shipping ore and concentrates, while the mill was supplied with 140 tons daily.

TOOLE COUNTY.

The report upon Con. Mercur operations for April shows that during the month 24,000 tons of ore, or an average of 800 daily, were handled. The headings from the cyanide plant indicate an increase in the value of ore, and a corresponding increase in earnings over March, during which they were stated to over $150,000.

WASHINGTON.

CHELAN COUNTY.

Work has been commenced on the 13-mile long railroad from Lake Chelan to the Holden mines. The line, which is being constructed by the Chelan T. & S. Co., will be an outlet for a large volume of medium grade ore.

PIERCE COUNTY.

The Tacoma Smelting Co. has bought twenty-five acres adjoining the smelter property for $22,500. The adjacent tide lands have also been bought, giving an additional water front of 1200 feet. Upon this land an extensive copper plant and lead refinery will be built, enabling the smelter to turn out gold and silver bullion, in place of the present copper product, which has to be shipped for refining. The capacity of the smelter will be increased from 400 to 700 tons of ore daily. The 300 men employed will be doubled. The cost of the new plant, it is estimated, will be nearly $500,000. The smelter is controlled by D. O. Mills and others interested in the Treadwell and Bunker Hill & Sullivan mines.

SKAMANIA COUNTY.

E. A. Sessions of Portland, Or., secretary Cascadia M. & D. Co., operating the Polar Star group, in St. Helens district, says the problem of the district is transportation. At present the copper ores carrying gold and silver are shipped to the Tacoma smelter at great expense, but the extension of the Vancouver & Yakima Railroad and construction of a smelter at Portland would open up the district.

STEVENS COUNTY.

It is reported that Philadelphia people propose to buy the Silver Butte group, near Northport, for $200,000. The prospective buyers already own the Great Western, adjoining. It is a silver-lead property.

WYOMING.

ALBANY COUNTY.

Lynn & Kinneman have completed their contract to sink 50 feet on the Copper King and have about four tons of 65% ore on the dump.

FOREIGN.

BRITISH COLUMBIA.

W. I. Reddin of Rossland says, after returning from a visit to the Similkameen country, that "besides the showings of copper ore on Copper and Kennedy mountains the outlying districts tributary to the town of Princeton give promise of great mineral wealth. Probably the most important asset of the district is the coal measures. The most important are those immediately surrounding the town of Princeton. Here is a well-defined coal basin, probably comprising an area of 50 square miles, every acre of which has been located during the past month. No less than six other representatives of capital were in camp at the same time that I was, locating and acquiring coal lands. This coal deposit has long been known, but no attention was paid to it on account of the lack of transportation facilities, and the news that the railroad is to be built caused the stampede to take it up. Alex. Sharp, the coal expert, for many years with the Dunsmuirs, has acquired 8000 acres of land for his principals, Messrs. Burns, Marpole et al. The measures contain three seams of coal of 7 feet, another of 14 feet, and a third of 35 feet. The first seam is a lignite, the second bituminous, and the third and thicker seam, as far as can be determined at present, appears to be anthracite. The various parties interested are making preparations to develop at once, and the present summer will witness much activity in the coal section around Princeton. I secured a block of 6000 acres for myself and associates, which will be developed at once. The copper mining section, which is close to these measures, will necessarily make a market for the coal. Besides this the Boundary country, which is only 125 miles away, will of necessity purchase its coal and coke in the Similkameen country because it is closer than are the Crow's Nest collieries."

J. R. Lee, manager of the Texada iron mine, states that forty men will be brought from Seattle to work on the property on a large and systematic plan of development. The mine is owned by the Puget Sound Iron Co. The deposit is said to be very large. A railway 3 miles in length will be built from the mine to Gillis bay, and ore will be sent to the Irondale smelter. It is proposed to ship eighty tons of ore per day this year. Smelting works will eventually be erected on the ground.

The ore shipments from Phœnix for the first four months of 1901 by the Miner-Graves syndicate to the smelter at Grand Forks are 73,522 tons, an average of 610 tons daily.

It is reported that New York people have bought the Tecumseh and Tuscumby claims for $18,000, payable in four months. The claims are in Windermere district and are extensions of the Iron Cap, also purchased by New York parties.

G. McFarland of Nelson has received the contract for building the concentrator and compressor plant building at the Enterprise mine on Ten Mile. The plants are expected to be in operation by next September.

The Union Jack group, the Jumbo and Florence, at Lardeau, are bonded to a Minneapolis syndicate.

NOVA SCOTIA.

The gold mining industry for 1900 shows a considerable improvement on 1899, the production being 30,399 ounces, against 27,772. The average yield for the whole province is 9.25 dwts. per ton. The Richardson mine paid in dividends $26,500, expended in machinery and lands $15,000, and put $5000 into a sinking fund. The total profits for the year amounted to $46,500 from an average gold yield of $3 per ton of ore. The Richardson Co. proposes adding twenty stamps to the mill and four concentrators.

MEXICO.

Over 150 Americans are employed at the Moctezuma C. Co. at Placeritas de Nacosari, Sonora; Phelps, Dodge & Co. of New York are the principal owners, and the output is controlled by the Amalgamated C. Co. The final surveys of the railroad from these mines to Bisbee have been made, and grading and track-laying are being actively pushed forward in the vicinity of Fronteras. A preliminary survey is soon to be made to some point on the west coast of Mexico.——The Vacquero mine, 5 miles north of Placeritas de Nacosari, is working with a few men. The ore is used by the Moctezuma Co. as a flux.——The San Miguel M. Co. have shut down their mill, having bonded their copper properties south of the Portico mountains.——Watson & Catleff have been operating the cyanide plant on tailings from the Creston de Oro mine.——The owners of the Monton de Cobre mine have made a test shipment of copper ore to the Placeritas smelter, with net results of over $37 per ton. This property consists of ten pertenencias and is situated 15 miles east of Placeritas de Nacosari, on the Arroya del Alisos. The values are found in azurite and copper glance running well in gold and silver.——The Prospecto mine has shut down and the machinery of their stamp mill has been moved to Placeritas. This property was worked for many years by the Kirk Bros., and has been a steady producer.——The Cochise mine is shipping ore by burro pack-train to San Miguelito. It is situated 15 miles north of the Prospecto mine and has produced rich silver ore from pockets.——In the Caballona section, north of Fronteras, Short & Co. have a shaft down over 100 feet on their copper property. They have 120 pertenencias, situated 6 miles from the new railroad. Assays from the surface ores gave a return of 40% copper, 45 ounces silver and .4 ounce gold to the ton. The best values are found in gray copper and iodide of silver.——Three miles south of the Short mine, Kirk Bros. & Co. are down over 100 feet in an iron blow-out, which assays well in copper.——More than 100 men are employed by the Lampazos Co., 40 miles south of Moctezuma. This property, now owned in Hermosillo, was formerly operated by an English syndicate, who extracted over $2,000,000 in silver from its workings.——A few men are employed at the Gavilan mine, which has been reopened. It is owned by the Corralitas Co. of Chihuahua. J. M. H.

Lohuoripa, Sonora, Mexico, April 28.

The La Cumbre mine, near Guadalupe y Calvo, Chihuahua, has been bought by Dr. C. Foster, of 31 Nassau street, New York, and associates, who propose to put in a 40-stamp mill at once.

At El Copete, about 25 miles east from Carbo, Sonora, the Melzer M. Co. have blown in their 200-ton furnace and are turning out twenty-five to thirty tons of copper matte daily. There are now fifty-

two 10-mule teams hauling coke between Carbo and El Copete, and eleven teams hauling supplies and timber.

It is reported that the final payment has been made on the Mulatos mine, in the Sahuaripa district of Sonora, by the Pennsylvania people who have been in possession under a working bond. The price was $350,000 gold and the sale includes a concession of 10 kilometers square. A 250-stamp mill is to be erected, and numerous other improvements are contemplated.

SOUTH AFRICA.

The Meyer and Charleton mines, Johannesburg, have been started again.

TASMANIA.

The quantities and values of minerals exported from Tasmania during the month of February, 1901, are:

	Value.
Copper ore, 1571½ tons	$110,000
Copper (blister), 852½ tons	400,000
Gold, 4243 ozs	75,000
Gold pyrites, 85 tons	2,600
Silver ore, 1264½ tons	105,000
Tin, 153½ tons	93,000
Oxide mineral, 1 ton	50
Total	$785,650

Personal.

R. G. WILSON of Salt Lake City, Utah, is in California, examining mines.

J. M. LIBBY of Reno is now Supt. Wadsworth mill, in Olinghouse district, Nev.

WM. C. RALSTON, Supt. Melones mine, at Robinson Ferry, Cal., is in Boston, Mass.

H. L. JOHNSON, Supt. Oriental mine, Alleghany, Cal., is in Denver, Colo., for a short time.

THOS. H. SHERRARD of the U. S. Geological Survey, Washington, D. C., is in Phœnix, Arizona.

FRANK MOREHOUSE, who has been examining mines in Mexico, has returned to Salt Lake City, Utah.

DANIEL SAYER, Supt. Butterfly-Terrible mine, Ophir, Colo., has returned there from a visit to Mexico.

W. E. COUL, formerly Supt. Stockton gravel mine, now occupies that position at the Mapes mine, Sonora, Cal.

L. C. DOTY, formerly of Eureka, Utah, has accepted the superintendency of the Robust M. & M. Co., at Ely, Nev.

M. CLERE, M. E., of Paris is in Atlin, B. C., directing the opening of the mines of the Lamare Syndicate of Paris.

R. LECKIE-EWING, superintendent of the Empire mines, Lardeau, B. C., will shortly return there from London.

G. H. MCDONALD of Ashland has accepted the position of foreman at the Braden mine, Gold Hill, Oregon.

E. C. UREN, superintendent of the Shawmut mine at Shawmut, Cal., has returned there from a trip to San Francisco.

PROF. H. C. BEELER of Cambria, Wyo., has been appointed State Geologist of Wyoming. He is the first to fill the office.

FRANK HARRIS, manager of the Great Northern M. Co. mines in Oregon, has returned there after several months absence in New York.

E. STEWART, formerly Supt. Ajax mine, Tintic, Utah, but who has been in Mexico for some time, is visiting Salt Lake City, Utah.

WM. VAN SLOOTEN, M. E., of New York has gone to Peru to examine mines there in which he and other New York people are interested.

L. GILSON, manager of the Utah Gold Refinery at Salt Lake City, Utah, is in Montana, laying out the season's development work on properties in which he is interested.

J. H. STRITE, foreman of construction for the Fraser & Chalmers Co. has gone from Redding, Cal., to Irondale, Mo., to superintend the construction of a reduction plant.

W. W. WAGONER, county surveyor of Nevada county, Cal., is an applicant for the position of Debris Commissioner of California, to fill the vacancy made by the death of John F. Kidder.

R. D. FEATHERSTONHAUGH, manager Nimrod Syndicate, Ltd., placer mine at Atlin, B. C., has been appointed to a similar position with the Atlin M. Co., operating at the same place.

W. A. PRITCHARD, superintendent of the Keystone Con. mines at Amador City, Cal., has been in San Francisco during the week in connection with new stamp mill to be put on the mine.

H. T. NEWELL, chief hydrographer, of Washington, D. C., has been examining the Carson river in Nevada with reference to the irrigation storage surveys now being made by the U. S. Geological Survey.

J. G. DAVIS of Juneau, Alaska, has returned there after a trip through the mining sections of Oregon, Colorado, Utah and Idaho, examining processes in use, with a view to their adaptation to Alaska conditions.

Commercial Paragraphs.

THE Ericsson Telephone Co. of 296 Broadway, New York, have received an order from the War Department Signal Office at Washington, D. C., to ship 200 of their telephones to Manila, P. I., as the result of a favorable report on their use in that place by the department during the last year.

BAKER IRON WORKS, Los Angeles, have just closed a contract with the Alamitos Land Co., Long Beach, for a large pumping plant, consisting of Worthington triple expansion condensing pump, 9 and 14 and 22×15×18 and one 85 H. P. Atlas high pressure boiler. The capacity of the plant is 3000 gallons per minute.

THE New Process Raw Hide Co., Syracuse, N. Y., has recently added considerably to its equipment by the purchase of new machinery, including three Gleason bevel gear planers, which plane the teeth accurately to cone lines, and an additional automatic spur gear cutter, and is now in the market to make metal gears to order in addition to its well-known New Process noiseless pinions.

FOR over thirty years Denniston's San Francisco Plating Works were at 653-655 Mission street, but increasing business necessitating more room, the establishment has been removed to 743 Mission street, between Third and Fourth streets, where it now has a most complete and extensive plating works embodying all the latest improvements in the art. Note the change of address.

THE Pelton Water Wheel Co. of San Francisco and New York is credited with having recently received a pipe order of considerable magnitude from Singapore, India. This consists of 26,000 feet of sheet steel riveted pipe, varying from 24 to 20 inches in diameter, and aggregating about 600 tons in weight. The order also includes a large number of hydraulic giants and elevators—the installation being intended for use in connection with one of the large tin mines, which are so numerous in that locality. This order was secured against active competition with the foreign markets, which speaks well for a local concern.

Books Received.

"Tunneling," by Charles Preline, C. E., published by D. Van Nostrand Co., 23 Murray and 27 Warren Sts., New York, 310 pages, 8vo. The author has written a very excellent work for the student of railroad engineering. Modern construction, its methods, reasons and tools, are simply and clearly explained. Tunnel lining with iron and masonry, construction with shields, and submarine tunnels are so discussed as to clearly elucidate the successful practice of engineers. Price $3.

The eleventh annual report of the State Board of Trade of California has been published for free distribution on application made to it at San Francisco. It is twenty-five pages of statistical figures and notes dealing with the industrial production of the State in readable, comprehensive form. Mining is not overlooked in the compilation, there being several pages devoted to it. The information given is reliable and valuable for reference.

Recently Declared Mining Dividends.

	Payable.
Empire State-Idaho M. Co., Idaho, 10 cents per share	May 15
Mammoth M. Co., Utah, 5 cents per share, $20,000	May 10
South Godiva M. Co., Utah, $3.75 per 1000 shares, $1000	May 10
Daly-West M. Co., Utah, No. 22, 30 cents per share, $45,000	May 15
Swansea M. Co., Utah, monthly, 5 cents per share, $5,000	May 15
Con. California & Virginia M. Co., Nev.; 10 cents per share, $21,600	May 10
Silver King, Utah, monthly, $100,000	May 10
Plumbago M. Co., Cal., monthly, $10,000	May 15
Bald Butte, Montana, $15,000	May 10
DeLamar, Idaho, 24 cents per share, $96,000	May 9
La Fortuna, Arizona, 5 cents per share, $12,500	May 9
Standard Con. G. M. Co., Cal., 10 cents per share, $17,839	May 21

List of U. S. Patents for Pacific Coast Inventors.

REPORTED BY DEWEY, STRONG & CO., PIONEER PATENT SOLICITORS FOR PACIFIC COAST.

FOR WEEK ENDING APRIL 30, 1901.

673,106.—ARC LAMP — S. H. Anderson, Pasadena, Cal.
672,931. — NECKTIE HOLDER — H. W. Ayres, Los Angeles, Cal.
673,073. — LIQUID AIR VESSEL — G. A. Bobrick, Los Angeles, Cal.
673,134.—GATE—O. K. Cleveland, America, Cal.
672,974.—PHOTO-PLATE HOLDER—H. A. Clifford, S. F.
673,016.—MOWING MACHINE—C. C. Coffinberry, Union, Or.
673,135.—SEED DRILL — H. A. Denny, Reardan, Wash.
673,118.—REFLECTOR — J. T. Edwards, Weaverville, Cal.
673,255.—FISH DRESSING MACHINE—S. Haigh, S. F.
672,940.—PIPE WRENCH — A. Heberer, Alameda, Cal.
673,263.—TIMBER HOOK — Hitchings & Lachappelle, Hoquiam, Wash.
672,981. — SEPARATOR — R. W. Jessup, S. F.
672,982. — SEPARATOR — R. W. Jessup, S. F.
673,023.—GARMENT SUPPORTER—J. Jorgenson, S. F.
673,058.—CONCENTRATOR — M. S. Leve, Fruitvale, Cal.
672,949.—VEHICLE AXLE—A. C. Massey, Los Angeles, Cal.
673,213.—SCALE—J. A. Menard, Phœnix, A. T.
673,216. — STAPLE — W. H. Morehouse, Wasco, Or.
673,142. — STAMP AFFIXER — A. H. Schaar, S. F.
673,068.—VALVE PISTON—J. P. Simmons, S. F.
673,031.—BABY CARRIAGE—A. H. Schleuter, Oakland, Cal.
673,180.—VAPORIZER—H. G. Tassell, S. F.
673,304.—CULTIVATOR — B. D. & F. M. Tharp, Athena, Or.
671,371.—STEEPER—J. T. Thorp, Corvallis, Or.
673,330.—TICKET CASE—J. E. Waldeck, Los Angeles, Cal.

Notices of Recent Patents.

Among the patents recently obtained through Dewey, Strong & Co.'s SCIENTIFIC PRESS U. S. and Foreign Patent Agency, the following are worthy of special mention:

FRUIT GRADING MACHINE.—No. 672,453. Dated April 23, 1901. S. McGarvin, Fresno, Cal.

This invention is designed to grade fruit into different sizes, and consists of inclined screens disposed in parallel planes with an imperforate conveyor beneath and parallel of each screen, and in the plane with and a part of the succeeding screen. Means are provided for horizontally reciprocating the frame and projecting the fruit through the machine and contrary to the force of gravity. Means are provided at the end of each screen whereby the varying grades of fruit thus segregated are discharged.

FISH DRESSING MACHINE.—No. 673,255. Dated April 30, 1901. Samuel Haigh, San Francisco, Cal., assigned to Alaska Packers' Association, of same place.

This invention is designed to receive the entire fish at one end of the machine, and to successively remove fins, head, tail and to disembowel and clean the fish, and place it in condition to be subsequently cut up, introduced into cans or otherwise packed. It consists of mechanism for guiding and transmitting the fish through the various operations mentioned, so that these operations are successively completed.

GARMENT SUPPORTER.—No. 673,023. Dated April 30, 1901. John Jorgenson, San Francisco, Cal., one-half assigned to A. Quade, of same place.

This invention is designed to support garments, and for like uses, and consists of two rigid bars, the lower edges of which are so curved that one may fit and interlock with the other. The upper ends of these bars are jointed to a third bar at such a distance apart that by tilting in one direction, the inner or interlocking ends of the bars are separated, and when the article to be secured is inserted by straightening them out, the interlocking ends grasp the material and hold it firmly in place. A suitable suspending attachment may be connected with the third bar.

Latest Market Reports.

SAN FRANCISCO, May 9, 1901.

SILVER—Per oz., Troy: London, 27⅝d (standard ounce, 925 fine); New York, bar silver, 59½c (1000 fine); San Francisco, 59½c; Mexican dollars, 50¼c San Francisco, 48¾c New York.

COPPER.—New York: Lake, 1 to 3 casks, $17.25; carload lots, $17.00; Electrolytic, 1 to 3 casks, $16.75; carload lots, $16.62½; Casting, 1 to 3 casks, $16.60; carload lots, 16.50. San Francisco: 18. Mill copper plates, 20c; bars, 22@23c. London: £69 4s 6d per ton.

LEAD.—New York, $4.42½; Salt Lake City, $4.00; St. Louis, $4.32½; San Francisco $4.90, carload lots; 5¼c 1000 to 4000 lbs.; pipe 6, sheet 6½, bar 5¼c; pig, $5.25. London, £12 7s per ton=2.77½ cents per lb.

SPELTER. — New York, $4.20; St. Louis, $3.75; London, £16 2s 6d per ton =3.58½ cts. per lb; San Francisco, ton lots, 5¼c; 100-lb lots, 6c.

ANTIMONY.—New York, Cookson's, 10c; Hallett's, 9c; San Francisco, 1000-lb. lots, 10c; 300 to 500 lbs., 11c; 100-lb. lots, 13@15c.

IRON.—Pittsburg, Bessemer pig, $17.25; gray forge, $16.50; San Francisco, bar, per lb., 2.65c in small quantities.

STEEL.—Bessemer billets, Pittsburg, $24; open hearth billets, $27.00; San Francisco, bar, 7c to 12c per lb.

TIN.—New York, pig, $26.00; San Francisco, ton lots, 28c; 1000 lbs., 28½c; 500 lbs., 28½c; less, 29c; bar tin, ₩ lb, 32½c.

QUICKSILVER. — New York, $51.00 large lots; London, £9 2s 6d; San Francisco, local, $47.00 ₩ flask of 76½ lbs.; Export, $45.00

MAGNESIUM.—New York, $2.90 ₩ lb.; San Francisco, $3.75.

ZINC.—San Francisco, 5½c; slab, 5¾c; bar, 7c; zinc dust, N. Y., 8c.

BABBITT METAL.— San Francisco, No. 1, 10c.

SOLDER. — Half-and-half, 100-lb. lots, 18c; San Francisco, Plumbers', 100-lb. lots, 15c.

PHOSPHORUS. — F. o. b. New York 50@60c ₩ lb.

ASSAY LITHARGE.—San Francisco, 10c ₩ lb, small lots.

BISMUTH.—New York, ₩ lb., $2.25 50-lb lots; San Francisco, $2.50 to $2.75 lb lots.

FERRO-MANGANESE. — Pittsburg, 80%, domestic, $62.50, large lots.

TUNGSTEN.—New York, ₩ lb., 95c; San Francisco, $1.15.

FERRO-TUNGSTEN. — New York, 37%, 32c; San Francisco, 65c (60%).

NICKEL.—New York, 50@60c ₩ lb.

PLATINUM.—San Francisco, crude, $22 ₩ oz.; New York, $22 per Troy oz

ALUMINUM.—New York, No. 1, 99% pure ingots, 35c; No. 2, 90%, 30c to 35c.

POWDER.—F. o. b. San Francisco: No. 1. 70% nitro-glycerine, per lb., in carload lots, 15¼c; less than one ton, 17¼c. No. 1*, 60%, carload lots, 13½c; less than one ton, 15½c. No. 1** 50%, carload lots, 11¾c; less than one ton, 13¾c. No. 2, 40%, carload lots, 10c; less than one ton, 12c. No. 2* 35%, carload lots, 9½c; less than one ton, 11½c. No. 2** 30% carload lots, 9c; less than one ton, 11c. Black blasting powder in carload lots, minimum car 728 kegs, $1.50 per keg; less car lots, $2 per keg.

CAPS.—3x, $5.50 per 1000; 4x, $6.50; 5x, $8; Lion, $9, in lots not less than 1000.

FUSE.—Triple tape, $3.60 per 1000 feet; double tape, $3.00; single tape, $2.65; Hemp, $2.10; Cement No. 2, $3.00; Cement No. 1, $2.65, in lots of 3000 feet and up.

CANDLES.—Granite 6s, 16 oz., 40s., 10¾c ₩ set; 14 oz., 40s., 9¾c.

CHEMICALS.—Cyanide of potassium, 98%-99%, jobbing, 32½@33½c ₩ lb.; carloads, 30@31c; in 10-lb. tins, 40c; sulphuric acid, in carboys, 66% B, 2c ₩ lb.; soda ash, $1.90 ₩ 100 lbs. 58%; hyposulphite of soda, 2¾@3c ₩ lb.; blue vitriol, 5¾@6¼c ₩ lb.; borax, concentrated, 7@8c ₩ lb.; chlorate of potash, 12@13c; roll sulphur, 6c; alum, $1.90@2.00; flour sulphur, French, 2¼@2½c; California refined, 1¾@2c; nitric acid, in carboys, 8c ₩ lb.; caustic soda, in drums, 3@4c ₩ lb.; Cal. s. soda, bbls., $1.00; sks, 95c ₩ 100 lbs.; chloride of lime, spot, $2.50@2.60; nitrate of potash, in kegs, 8c; caustic potash, 10c in 40-lb. tins.

OILS.—Linseed, pure, boiled, bbl., 75c; cs., 80c; raw, bbl., 73c; cs., 78c. Deodorized Stove Gasoline, bulk, 14½c; do., cs., 20½c; 86° Gasoline, bulk, 20c; do., cs., 26c; 63° Naphtha or Benzine, deodorized, in bulk, per gal., 13½c; do., in cs., 19½c; Lard Oil, Extra Winter Strained, bbl., 75c; cs., 80c; No. 1 bbl., 50c; cs., 55c. Neatsfoot Oil, coopers' bbls., 60c; cs., 65c; No. 1 bbl., 50@52½c; cs., 55@57½c.

COAL. — San Francisco, coast, yard prices: Wellington, $9; Seattle, $7.00; Coos Bay, $5.50; Southfield, $9.00. Cargo lots, Eastern and foreign: Wallsend, $8.00; Brymbo, $7.50; Pennsylvania, hd., $14.00; Scotch, $8; Cumberland, $12; Cannel, $9.50; Welsh Anthracite, $12.00; Rock Springs, $8.50; Colorado Anthracite, $14.50. Coke, $16 per ton in bulk; $18 in sacks.

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SITUATIONS WANTED.

After May 20, a young man (33) with college training and three years' experience as assayer, cyanider and assistant superintendent, successively, with prominent mining company, wishes a similar position, or would manage a small property at a reasonable salary. References. Address M. T., 880 Eddy St., San Francisco.

WANTED—POSITION BY A YOUNG ENGINEER with good education and several years' experience in various branches of electrical work. Position in power transmission work preferred. Address "H. J.," care Mining and Scientific Press.

ASSAYER,

up to date, thorough and reliable, wishes position. Good penman, draughtsman and bookkeeper. Best references. Speaks some Spanish. Modest salary. Address F. C. S., this office.

ASSAYER, BOOKKEEPER, TYPEWRITER and General Office Man desires a situation. Ten years' practical experience. Best references given. Address A. Sayer, care of Mining and Scientific Press office.

WANTED.

WANTED.—A COMPETENT FOUNDRY AND machine shop foreman; must be a draughtsman and familiar with mining machinery. State terms Give references. Address
ROY & TITCOMB, Inc., Nogales, Arizona.

Wanted, A Young Draughtsman.

One experienced in smelter work preferred. Address ALFRED VON DER ROPP, Selby, Cal.

WANTED.

A Man Who Understands Building a Brick Reverberatory Furnace.

Party with some capital preferred. Have contract to build one at once. Must be practical and experienced. Address "B. L. R.," care Mining and Scientific Press.

THE CALIFORNIA DEBRIS COMMISSION, HAVING received applications to mine by the hydraulic process from Charles Lilly and W. E. Emery, in the Avalanche Mine, near Vallicita, Calaveras Co., to deposit tailings in Grapevine Gulch; and from W. J. Cox and F. E. Keesy, in the Taylor Diggings, near Taylorville, Plumas Co., to deposit tailings in Hinchman Creek, gives notice that a meeting will be held at Room 59, Flood Building, San Francisco, Cal., on May 27, 1901, at 1:30 P. M.

Electric, Railway and Manufacturers' Supply Co.

548 MISSION ST.,
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Model and Die Making. Special Machine and Experimental Work of All Kinds. Send Us Your Drawings and Get Estimates.
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Parties interested in placer deposits that cannot be successfully operated, owing to a lack of water, should communicate with THOMAS A. EDISON, Orange, N. J.

WE BUY very rich Ores, Dental Scraps, Tellurium Ores, Mill Wastes, Jewelers' Sweeps, Gold Retorts, Old Iron Retorts, Base Amalgam, Quicksilver, Amalgamated Plates, Gold and Silver, Old Slags.
A. M. DONALDSON & CO.,
ASSAYERS AND WASTE PRODUCT SMELTERS,
1661 Larimer St., Denver, Colo.
Donaldson's Assayers' Slag Hammer { 1 lb. ..... $1.10 / 1 lb. 8 oz. $1.25

AUTOMATIC SAMPLING
Mill Plans, Cyanide, Concentration, Smelter.
F. D. BAKER, Mech. Engr., DENVER.

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40-page pamphlet containing questions asked by Examining Board of Engineers.
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FOR SALE.

FOR SALE.

The irons for a heavy pump bob, formerly used on 6-inch Jackhead pump, including cast bearing for elbow joint, with bolts and straps; cost $160; will be sold for $75 cash. Address IRA HILL REED, San Andreas, Cal.

FOR SALE.---1200 feet of 12-in. Steel Pipe, No. 14 gauge, in good condition.

Inquire PORT COSTA WATER CO., 326 California St., San Francisco, Cal.

Valuable Hydraulic Mining Property,

located in Plumas County, Cal., containing 273 acres, title U. S. patent, water rights, ditches, etc., FOR SALE AT A BARGAIN. Terms easy. For further particulars, apply to ALMARIN B. PAUL, 27 Crocker Building, San Francisco, Cal.

TO ASSAYERS.

A fine set of assay scales with pulp balance, and set of assay ton weights, all in good order, will be sold for $125, if applied for soon. The outfit consists of one Troemner's No. 5 balance with aluminum beam and agate bearings, mounted in glass case with sliding doors and plate glass bottom, original cost $175; also one Becker's pulp balance No. 18, with 8-inch beam, mounted in glass case with sliding doors, costing $26. Further particulars by addressing Box 4, San Andreas, Cal.

FOR SALE.

ONE COMPLETE PLACER MINING DREDGE

OF THE ELEVATOR TYPE.

With buckets having capacity of seven and a half cubic feet. Dredge only used few months. Located on Grasshopper creek, near Bannack, Mont. For full particulars, address THE BUCYRUS COMPANY, South Milwaukee, Wis.

SECOND-HAND MACHINERY.

PULLEYS, SHAFTING, BELTING, BOXES, BOILERS, ENGINES, HOISTERS, STAMP MILLS, RAILS, CABLE—all but little used.

THE S. S. MACHINERY CO.,

Sixth and Market Sts., DENVER, COLO.

SEND FOR DESCRIPTIVE CIRCULAR.

Special Meeting.

OXFORD BETA TUNNEL AND MINING Company.—There will be a special meeting of the stockholders of the Oxford Beta Tunnel & Mining Company, to be held at the office of the company, No. 135 Geary St., Room 111, San Francisco, at the hour of 4 o'clock P. M., on the 4th day of June, 1901, for the purpose of increasing the capital stock of the company from twenty-nine hundred shares of the value of one hundred dollars each to one hundred thousand shares of the value of two dollars and fifty cents each. By order of the Board of Trustees. W. H. KNIGHT, Secretary.

Notice of Meeting of Stockholders.

In accordance with the by-laws of that company, the Regular Annual Meeting of the Stockholders of the JAMISON MINING COMPANY, for the purpose of electing Directors for the following year and transacting such other business as may properly come before it, will be held at the office of the company, rooms 54-59, No. 120 Sutter street, San Francisco, California, at 2 o'clock P. M on MONDAY, the 20th day of May, 1901.

SAM W. CHEYNEY, Secretary.

THE S. H. SUPPLY CO.,

THE MACHINERY DEPOT OF THE WEST,

22d and Larimer Streets, DENVER, COLO.

During the past three months we have dismantled three mills: the Royal Gorge Mill, Canon City; the Oneida Reduction Works, Victor, Colo., and the Gold Brick Mill at Gunnison, Colo. The first of these was in actual operation less than thirty days; the second, ninety days, and the third one year. In all of these mills amalgamating machinery was used, and the consequence is that we have a great assortment of this class of machinery. For use it is as good as new in every respect. We are offering this machinery at a saving of from 50% to 75% over the cost of new machinery. We have:

14 Standard Amalgamating Pans.
7 8-Foot Settlers.
4 Cleanup Pans.
8 Amalgam Safes.
15 Quick Elevators.
4 Amalgam Cars.
5 Quick Tanks.
3 Retorts and Bullion Furnaces.

Two of these mills were dry crushing, containing the following roasting and drying machinery:

Howell Improved White Roasting Furnace (60x27).
3 18-Foot Revolving Ore Dryers.
1 Bruckner Roasting Furnace.
1 40-Foot Pierce Roasting Furnace.

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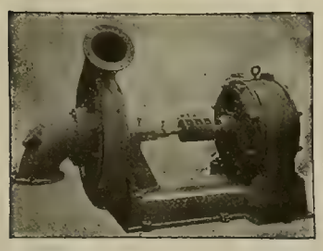

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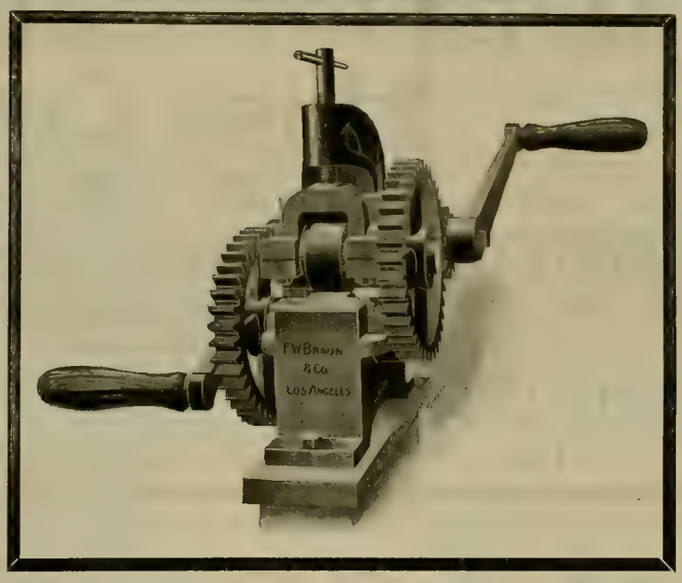

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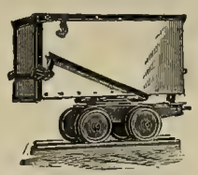

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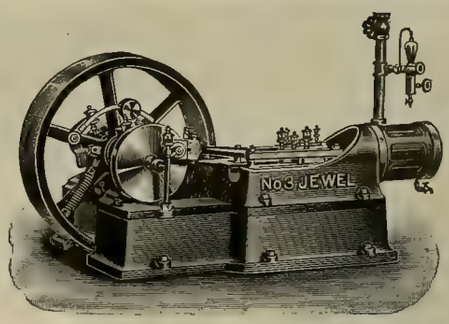

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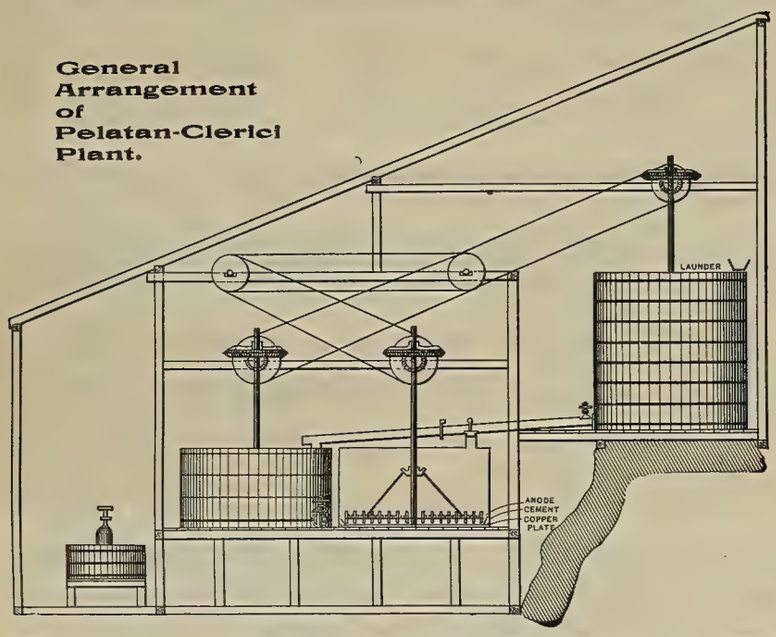

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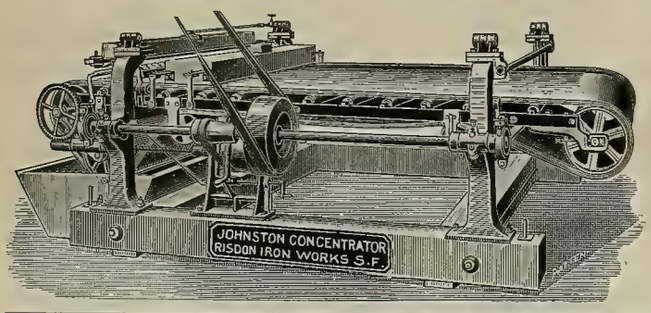

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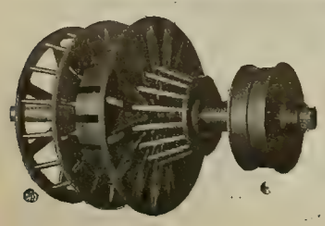

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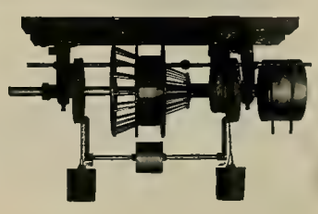

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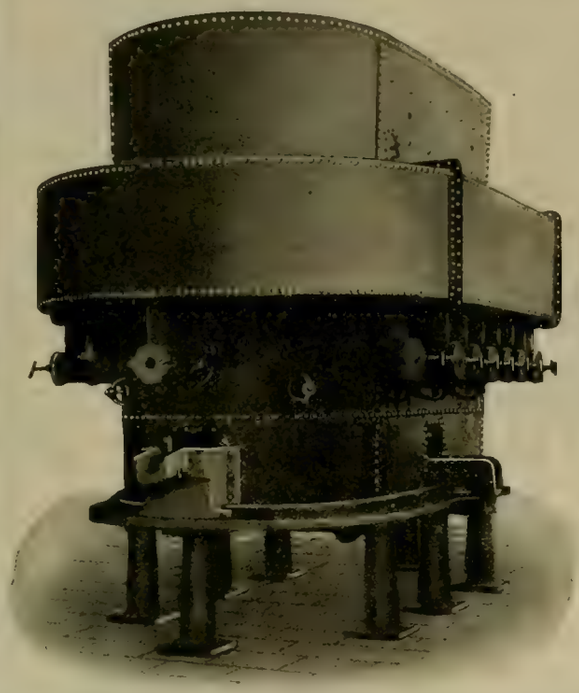

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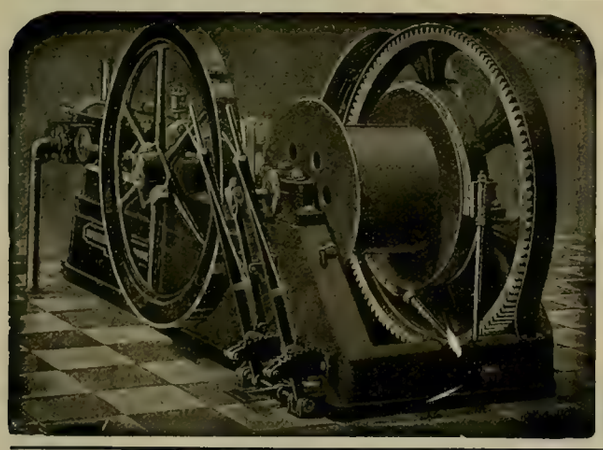

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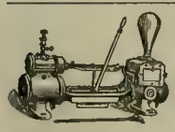

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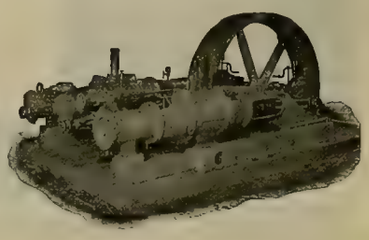

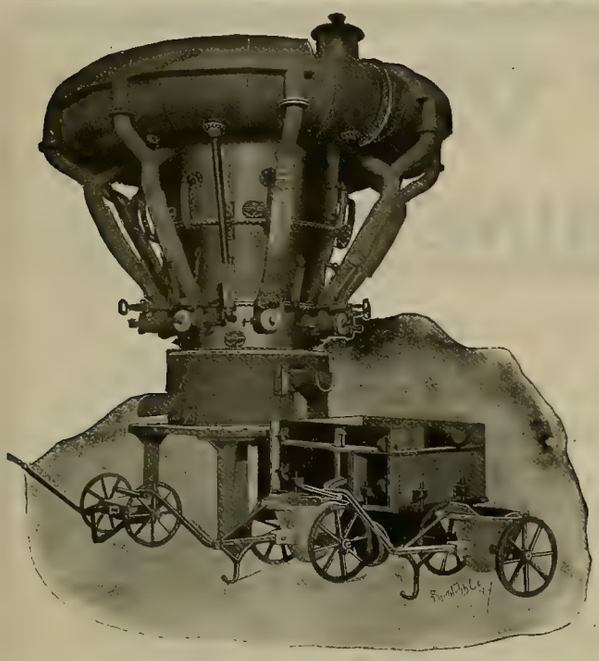

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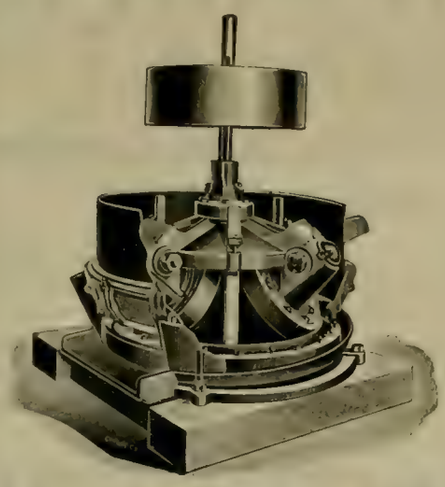

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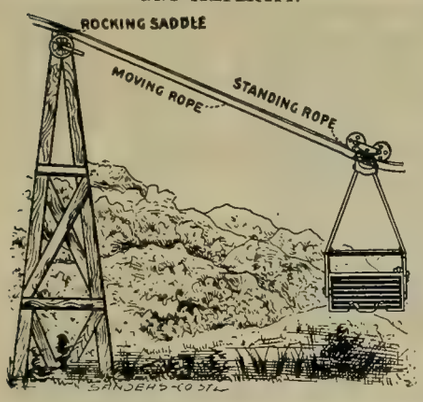

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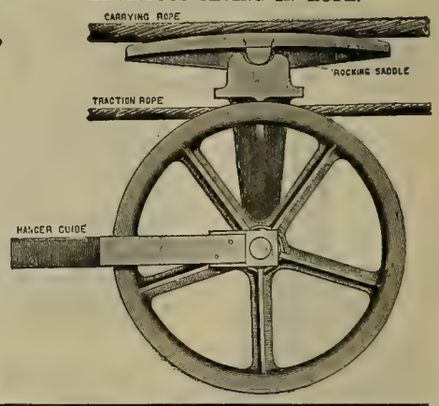

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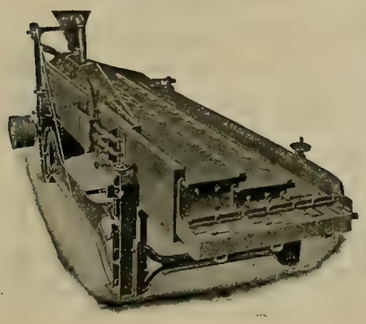

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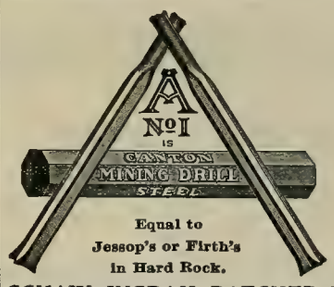

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For DIAMOND DRILLS and all Mechanical Purposes.

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FIRTH'S DRILL STEEL.

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Has no equal in Hard Rock Drilling.

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Multitudes in use for testing for minerals. Sizes and equipments to suit any and all conditions. Unexcelled for Placer Testing, Oil Wells, Water Wells, testing for Lead and Zinc, Iron and Coal; goes through anything; brings up everything. Large sizes drill as much as 1500 feet. In use all over the world. Every purchaser pleased. Used on boats for testing river and lake beds. Water no hindrance. No skilled labor required.

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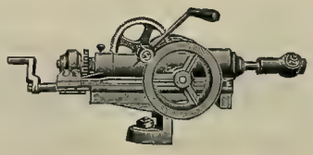

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IMPROVED GOLD DREDGES

OF THE SINGLE LIFT, CONTINUOUS BUCKET TYPE WITH

Working Capacity from 1500 to 5000 cubic yards per day,

AS DESIGNED AND MANUFACTURED BY

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IMPROVED GOLD SAVING DEVICE of highest efficiency.

DREDGES CONSTRUCTED COMPLETE UNDER GUARANTEE OF TRIAL RUN.

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WRITE FOR DETAILED INFORMATION. TEL. MAIN 5499.

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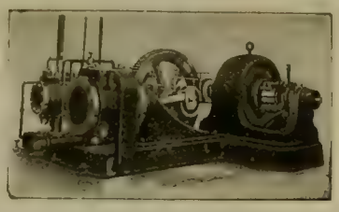
Illustrating Duplex Compound Electrically Driven Air Compressor, Class "J"

COMPLETE WITH AUTOMATIC UNLOADING DEVICE, ETC.



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We make 40 styles; 300 sizes. Send for catalogue describing all in detail

The **INGERSOLL-SERGEANT** Drill Company

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"THE DANIEL BEST"

50-Horse Power Traction Engine.

Freight carrying capacity of wagons, 16 TONS EACH, or a total capacity of train, 48 TONS.

CAPACITY OF ENGINE, 50-Horse Power.

Over One Hundred of these Powerful Engines in use on this Coast in the principal Logging and Lumbering Camps and for general freighting purposes.

EVERY ONE A SUCCESS AND MONEY MAKERS.

These outfits are particularly adapted to haul freight of any description from out-of-the-way places, and will reduce the cost of transportation at least one-half and in many instances two-thirds. They can generally be worked where animal teams now do the work, and haul their immense loads of from thirty to fifty tons, ascending and descending grades as much as 5 per cent to 30 per cent, depending upon condition of the road; loads may be increased to even greater amount on a firm and moderately level road.

Send for Descriptive Circulars and Price List. Wagons are built which are best suited for the kind of freight to be handled.

Estimates made for complete Steam Freighting Outfits. Address

THE BEST MANUFACTURING COMPANY,

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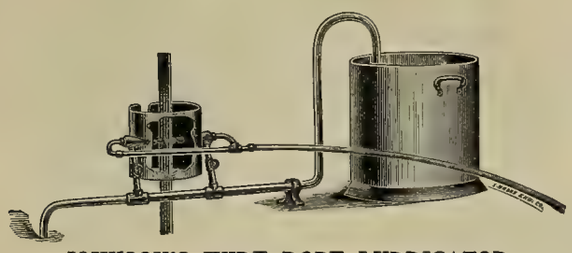
Double the Life of Flat Hoisting Ropes by Using

JOHNSON'S WIRE ROPE LUBRICATOR.



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Patent Applied for.

Lubricating compound forced into the rope by compressed air under high pressure.

One hundred feet of rope thoroughly saturated to the very center in one minute.

NO USER OF FLAT ROPE CAN AFFORD TO BE WITHOUT THIS MOST VALUABLE DEVICE.

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THE EDWARD P. ALLIS COMPANY,

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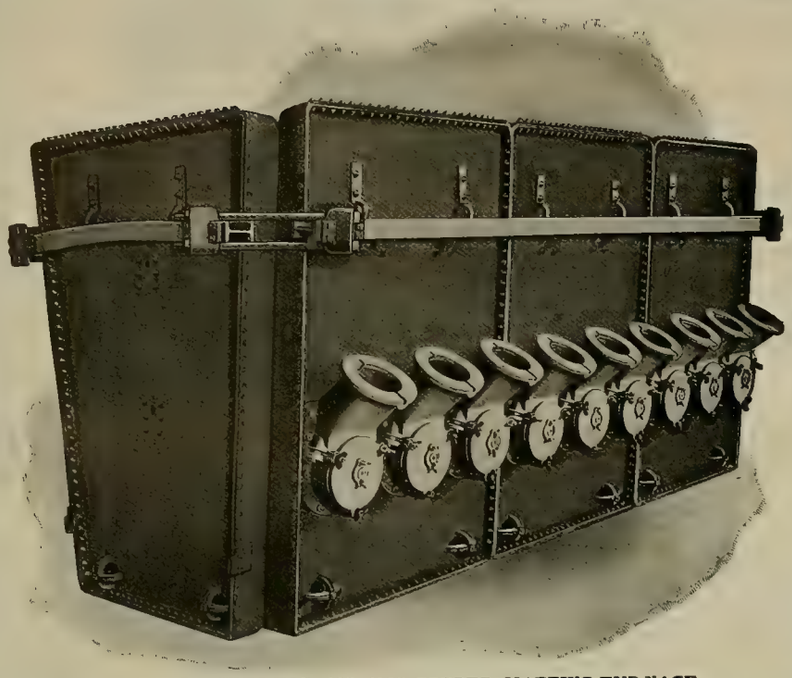

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OF APPROVED DESIGN.

High Class Material

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First Class Workmanship.

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Leschen Co.'s {Patent Aerial} {WIRE ROPE} TRAMWAY

FOR TRANSPORTATION OF ORE, COAL, DIRT, TIMBER, ETC.

Perfect Grip Clip,
Absolutely Safe,
Loads Automatically,
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Operated by One Man,
Cost of Maintenance Low,
Capacity Largest Obtainable.

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OF EVERY DESCRIPTION,

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Pacific Coast Smelting and Refining Works.

Works: Seal Bluff Landing, Cal.

Mines: Fresno County, Cal.

Purchasers, Samplers and Smelters

of

Gold, Silver and Copper Ores, and Furnace Products.

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DELINQUENT SALE NOTICE.

SOUTH SLIGER GOLD MINING COMPANY.—Location of principal place of business, San Francisco, California; location of works, El Dorado County, California.

Notice.—There are delinquent upon the following described stock, on account of assessment (No. 1) levied on the 25th day of March, 1901, the several amounts set opposite the names of the respective shareholders, as follows:

Names.	No. Cert.	No. Shares.	Amt.
V. W. Crysler	6	160	$3 20
W. P. Keeney	7	500	10 00
W. P. Keeney	8	500	10 00
W. P. Keeney	9	100	2 00
C. W. Keeney, Trustee	13	200	4 00
C. W. Keeney, Trustee	14	200	4 00
C. W. Keeney, Trustee	15	1,000	20 00
Fred. Lass	19	1,000	20 00
Fred. Lass	20	4,000	80 00
E. W. Newth	22	500	10 00
F. W. Keeney	23	400	8 00
T. F. Keys	24	500	10 00
D. K. B. Sellers	25	500	10 00
Fred. Lass	29	1,340	26 80
L. Ariani	31	250	5 00
V. Ariani	32	250	5 00
W. A. Mitchell	35	1,000	20 00
A. C. Baumgartner	38	500	10 00
W. A. Mitchell	42	2,000	40 00
Fred. Lass	43	500	10 00
Ira D. Orton and L. A. Maison	44	500	10 00
Ira D. Orton and L. A. Maison	45	500	10 00
R. E. Starr	52	500	10 00
W. A. Mitchell	53	1,000	20 00
Fred. Lass	54	1,000	20 00
Fred. Lass	5	1,000	20 00
A. C. Baumgartner	58	1,000	20 00
A. W. Mitchell	59	1,000	20 00
Fred. Lass	61	1,000	20 00
C. W. Keeney	62	200	4 00
C. W. Keeney	63	200	4 00
C. W. Keeney	64	4,000	80 00
C. W. Keeney	65	2,000	40 00
R. W. Bender	66	2,000	40 00
L. Ariani	67	160	3 20
A. F. Baumgartner	71	400	8 00
W. A. Mitchell	72	500	10 00
W. A. Mitchell	73	500	10 00
J. C. Donelly	76	1,000	20 00
C. W. Keeney	77	2,000	40 00
R. W. Bender	78	1,000	20 00
Jas. A. Kerr	79	1,000	20 00
A. F. Baumgartner	80	5,000	100 00
G. A. Coero	81	2,000	40 00
C. W. Keeney	82	76,100	1522 00

And in accordance with law, and an order from the Board of Directors, made on the 25th day of March, 1901, so many shares of each parcel of such stock as may be necessary, will be sold at public auction at the office of the company, Room 8, 402 Front street, San Francisco, California, on MONDAY, the 27th day of May, 1901, at the hour of 12 o'clock M. of said day, to pay said delinquent assessment thereon, together with costs of advertising and expenses of sale.

J. L. DANIELS, Secretary.

Office—Room 8, 402 Front street, San Francisco, California.

POSTPONEMENT.

The date of sale of the foregoing delinquent stock has been postponed from May 27th, 1901, to MONDAY, the 3d of June, 1901.

By order of the Board of Directors.

J. L. DANIELS, Secretary.

Office—Room 8, 402 Front street, San Francisco, California.

BRITISH COLUMBIA MINES.

Gold, Silver-Lead and Copper Properties. Excellent chance for profitable investments in legitimate mining in BRITISH COLUMBIA. Capital needed for developing promising prospects. A specialty made of FREE MILLING GOLD properties. Very promising FREE MILLING GOLD properties for sale; terms reasonable. Mines examined and reported on by reliable mining engineers. Correspondence solicited. Address Andrew F. Rosenberger, P. O. Box 700, Nelson, B. C.

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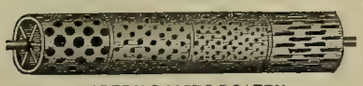
H. HIRSCHING.



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Perforated Sheet Metals, Steel, Russia Iron, American Planish, Zinc, Copper and Brass Screens for All Uses.

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QUARTZ SCREENS

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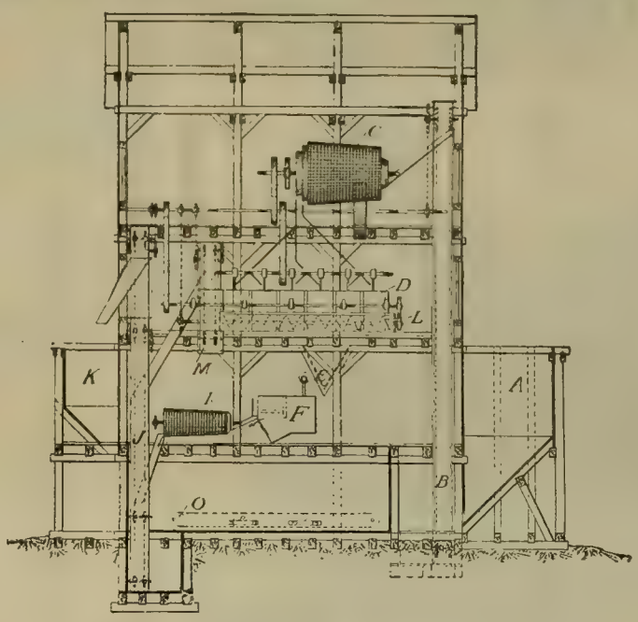
Coal Washing by the Luhrig Process.

Everywhere acknowledged to be the **Only Scientific** and **Thorough System** of washing coal for **Coke** or **Fuel.**



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Plans and estimates on application.

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OF OUR NEW

JACK-HEAD PLUNGER PUMP.

Pumps sand and grit without injury to cylinder.

Seldom requires packing and is easily repacked.

Forces water on the down stroke so does not require balanced bob.

Water column and pump rod can be made to perfectly balance.

Each pump is provided with an automatic air valve which relieves pump of air taken in when suction gets out of water.

Combines strength with lightness.

We make a specialty of pumps and would be pleased to forward to you our catalogue.

Send us your inquiries.

W. T. GARRATT & CO.,

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CRANE HYDRAULIC STRAIGHTWAY VALVES

MAY BE PACKED WHEN OPEN

TESTED TO 2,000 LBS. PER SQ. IN.

GUARANTEED FOR 800 LBS. WORKING PRESSURE

WE CARRY A FULL LINE OF HEAVY HYDRAULIC VALVES, FITTINGS AND PIPE, SUITABLE FOR PUMP COLUMNS IN MINES, LONG PIPE LINES, ETC.

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CRANE CO.

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For Best Satisfaction and Lowest Prices

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PERFORATED METALS

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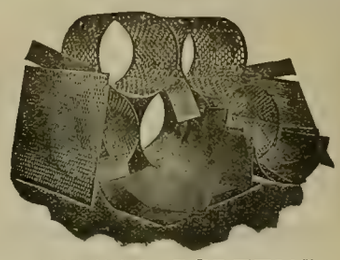

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PLACE YOUR ORDERS WITH

Fraser & Chalmers,

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SEND FOR SAMPLES, MENTIONING THIS PAPER.

LARGE VARIETY.

Perforated Metal

THE ROBERT AITCHISON PERFORATED METAL CO.
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SUPERIOR WORK.

Mining Screens

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Diagonal Slot,
Straight "
Burred "
Round Holes.

In American planished or Russian iron or steel for all purposes. GEO. WIMMER, 312 Iowa Street, San Francisco. Telephone Mint 1332.

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L. PETERSON, MODEL MAKER,

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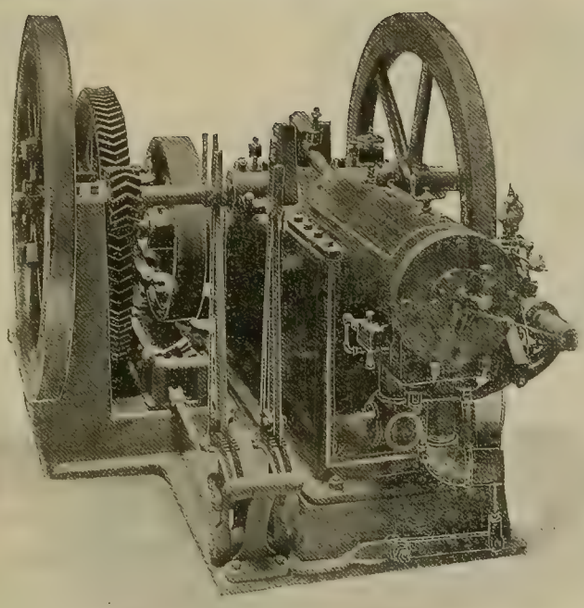
ANOTHER M AND E SPECIALTY.

NEW GASOLINE MINING HOIST.



All hoisting operations and engine management from one position at head of engine and facing the shaft.

THE M. & E. HOIST HAS, AMONG OTHERS, THE FOLLOWING FEATURES:

Supported Outboard Bearing.
Helical Gears.
Double-Faced Lubricated Iron Friction that will hoist 2000 lbs. with the pressure of one finger.
All speed changes made while engine is running, without operator leaving his position.
Either Post or Strap Brake
Variable speed from 100 R. P. M. to maximum of Governor Control.

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AND COMPLETE

CYANIDE PLANTS.

ILLUSTRATED CATALOGUE

MAILED FREE.

Zinc Lathes with Automatic Feed

FOR CUTTING ZINC SHAVINGS.

Pacific Tank Co., Manufacturers.

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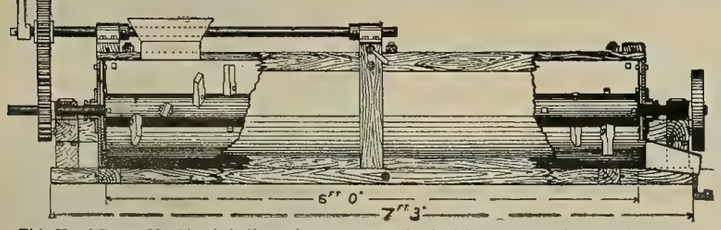
THE SNODGRASS HAND POWER COMMON SENSE PULVERIZER & CONCENTRATOR.

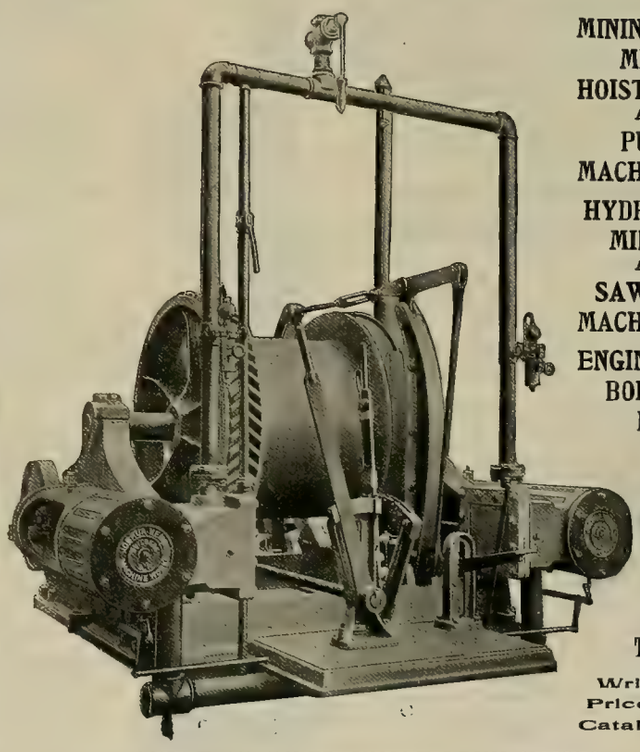


This Hand Power Machine is built on the same general principle as the regular machines, only being smaller in size and capacity. While this is intended to be run by hand power, it can easily be changed for steam or gasoline by simply putting on the pulley in place of the gearing. This has a capacity of 1½ to 2 tons per hour. This is just the machine for working at Cape Nome and other places where it is difficult to procure wood, coal, or gasoline for power. It requires but a small amount of water, and a pump can be attached, so that one person can pump the water as well as run the machine. It can easily be moved from place to place, as the heaviest part only weighs about 250 lbs., the total weight being about 500 lbs.

Address S. K. SNODGRASS, DENVER, COLO. (The Windsor.)

Joshua Hendy Machine Works,

Nos. 38 to 44 Fremont St., San Francisco, Cal.



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ENGINES, BOILERS, PUMPS.

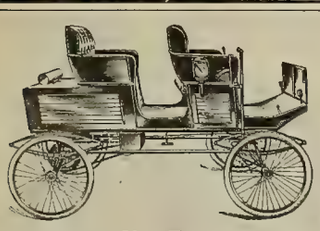
ORE and WATER BUCKETS.

SKIPS, MINING CARS, TEE RAIL.

Write for Prices and Catalogues.

DOUBLE CYLINDER SINGLE DRUM HOISTS.

The above form of Hoisting Engine has certain features of construction which make it superior to all others. It is mounted on a single solid base, with standboard for the operator. The engines are reversible link-motion and the drum is fitted with post-brakes which assures quick and safe operation. The design is compact and superior and the construction strong and substantial. We furnish them either with or without clutch pinions. The above cut illustrates an 8½ inch by 10 inch. Other sizes in stock and built to order.



No. 5.

The "Locomobile" Company OF THE PACIFIC.

STATIONS: 1255 Market Street, San Francisco. 103 South Broadway, Los Angeles. 106 Telegraph Avenue, Oakland.

Your choice in nine different styles. Ladies can operate them. Sold in guaranteed condition at reasonable prices. Illustrated catalogues and information will be sent on application.

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We print in legal size, 12x36 inches, the Mine Bell Signals and Rules provided for in the Voorhies Act passed by the California Legislature. The law is entitled "An Act to Establish a Uniform System of Bell Signals to Be Used in All Mines Operated in the State of California, for the Protection of Miners." We furnish these Signals and Rules, printed on cloth so as to withstand dampness. 50 Cents a Copy.

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Pelton Wheels

OPERATING

ELECTRIC TRANSMISSION PLANTS ALONE.

SENSITIVE REGULATION.

SEND FOR ILLUSTRATED CATALOGUE.

THE PELTON WATER WHEEL CO.,

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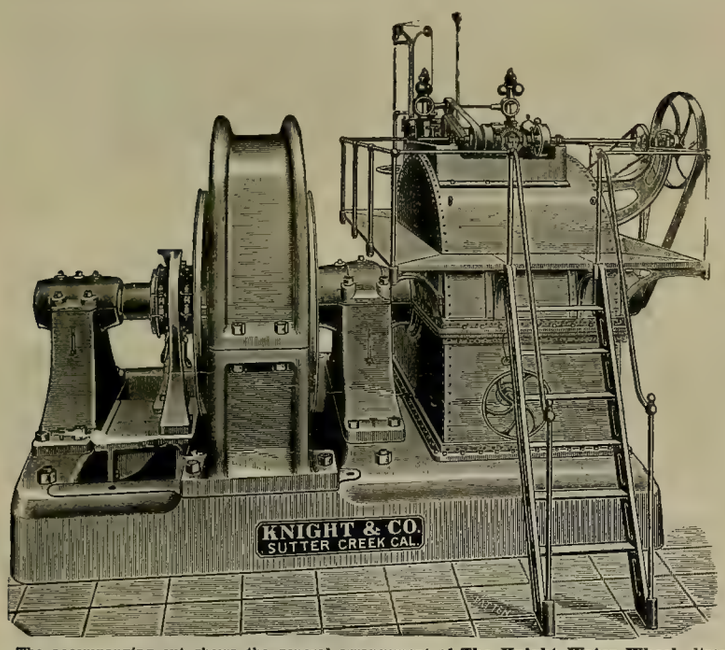
KNIGHT'S WATER WHEEL.

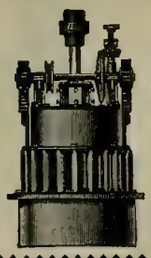


The accompanying cut shows the general arrangement of **The Knight Water Wheel**, direct coupled to a 750 kilowatt generator, with governor mounted on top of wheel casing.
These wheels are designed for **100 to 2500 H. P. Highest efficiency and regulation guaranteed**
WHEELS FROM 6 TO 24 INCHES, ENCLOSED IN CAST-IRON CASING.
Wheels for mill and reversible hoisting works a specialty.

KNIGHT & CO., Sutter Creek, Cal.

For full particulars, send for descriptive catalogue.

THE McCORMICK TURBINE.



FEATURES WORTH CONSIDERATION:

Great Capacity, High Speed, Unequaled Efficiency,
Steady Motion, Easy Working Gate,
Greatest Power from a Limited Quantity of Water, at Smallest Cost.

UNDOUBTEDLY THE MOST POPULAR TURBINE MANUFACTURED.

WRITE FOR CATALOGUE.

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THE HUG WATER WHEEL

has a guaranteed **EFFICIENCY OF 86%**, as shown by Test Curves from Cornell University.

Most Economical Wheel on the Market.

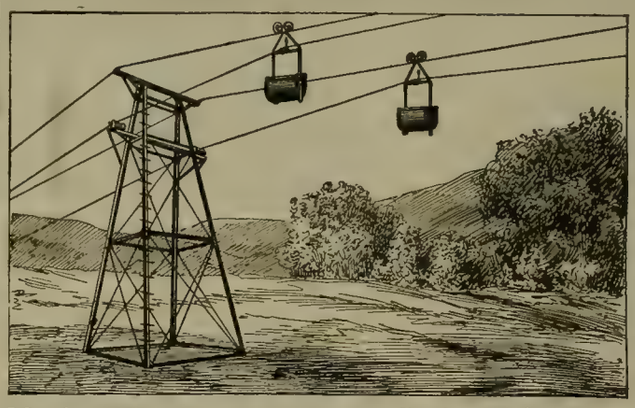
No Loose Buckets Possible.

Manufactured by D. HUG,
Denver, Colo., U. S. A.

VULCAN DOUBLE ROPE TRAMWAYS.

VULCAN ROPEWAYS (SINGLE ROPE SYSTEM).

AUTOMATIC LOADING AND DUMPING APPLIANCES



AND OTHER ROPE HAULAGE SYSTEMS.

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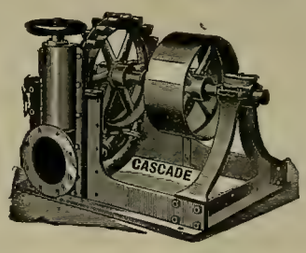
Vulcan Iron Works, Manufacturers of Mining Machinery, SAN FRANCISCO, CALIFORNIA.

TURBINE AND CASCADE WATER WHEEL

Adapted to all Heads from

3 Feet to 2000 Feet.

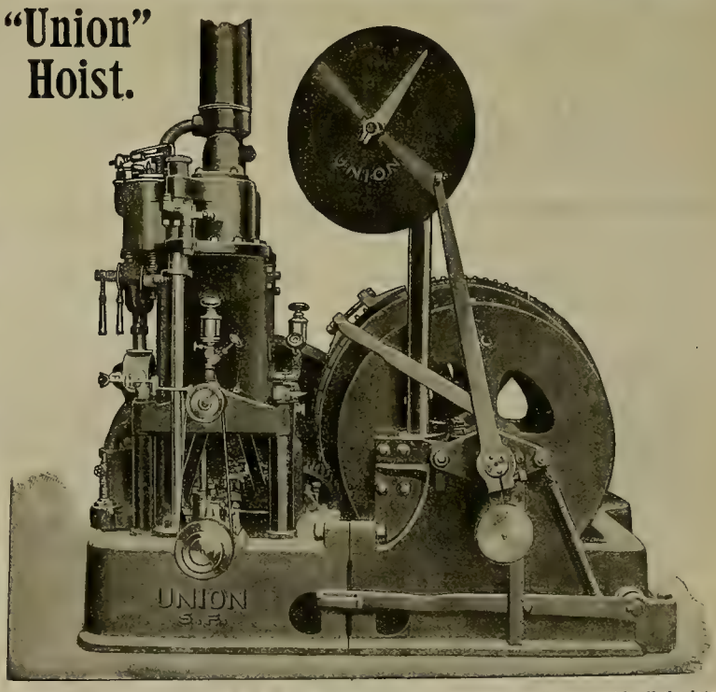


Our experience of 38 YEARS building Water Wheels enables us to suit every requirement of Water Power Plants. We guarantee satisfaction.

State your Head and requirements. Send for pamphlet.

JAMES LEFFEL & CO.
SPRINGFIELD, OHIO, U. S. A.

"Union" Hoist.



The above illustrates the 25 H. P. double cylinder, single drum "Union" hoist, with all the latest improvements.

THE UNION GAS ENGINE CO.

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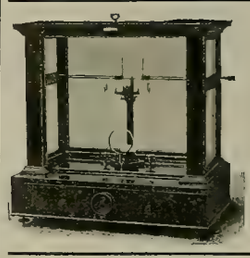

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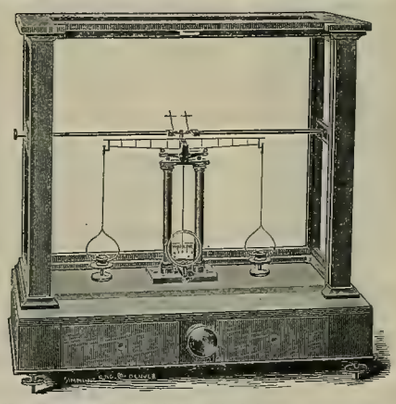

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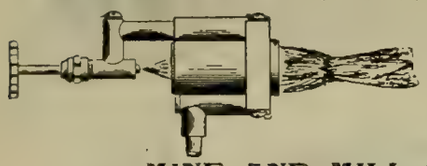

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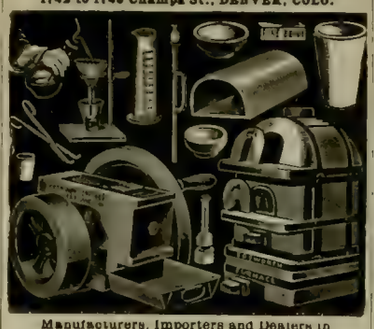

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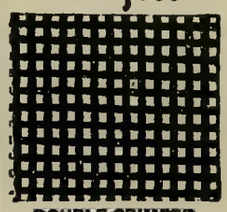

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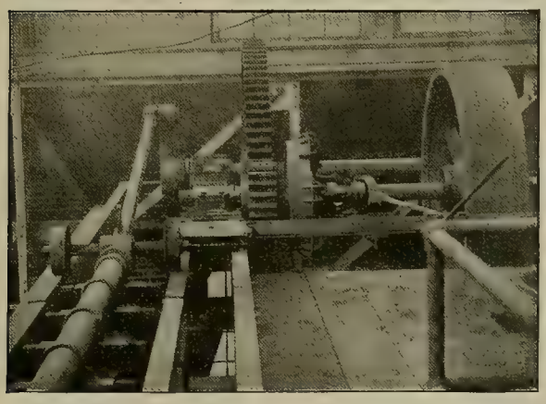

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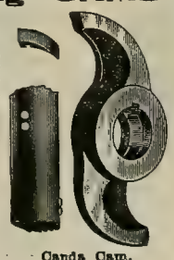

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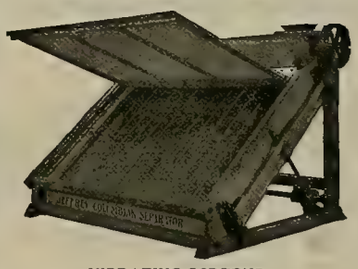

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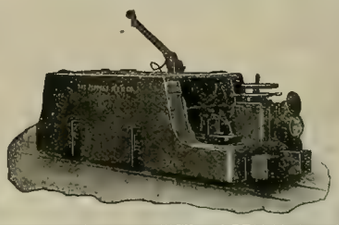

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4 Cents Per Ton Per Mile

Is what it costs to transport Ore with our systems of Aerial Wire Rope Tramways.

We'd like to send you our book telling you all about it, but we can't do it unless you write us

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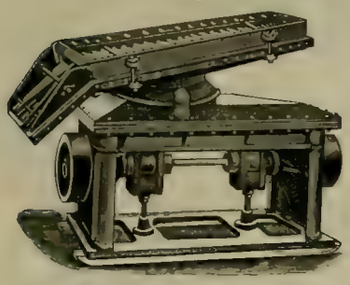

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Zinc,	Nickel,	Cinnabar,
Mica,	Clays,	Black Sands,
Tin,	Garnet,	Any Sands,
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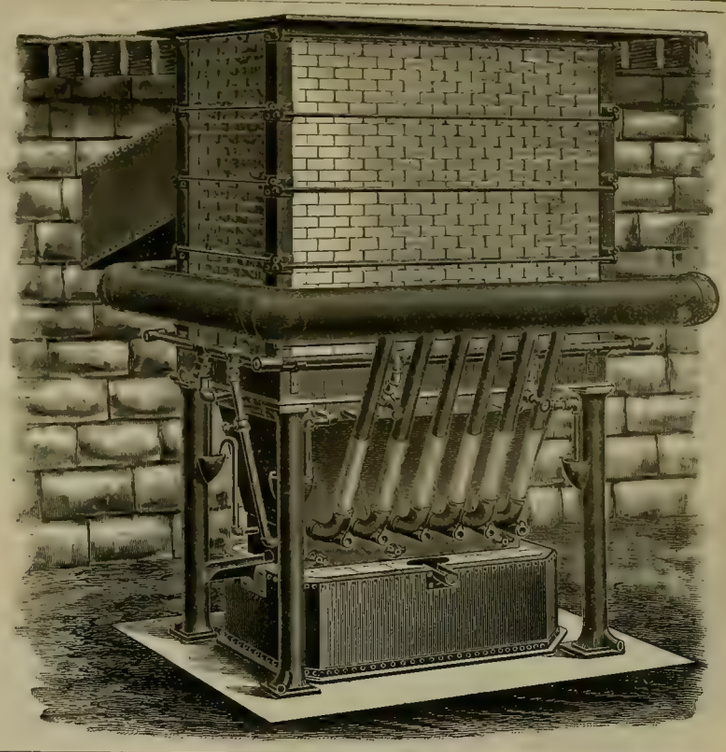

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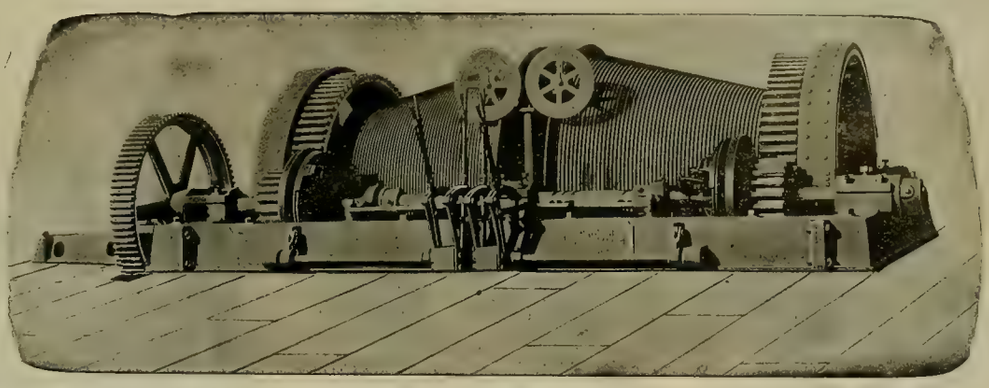

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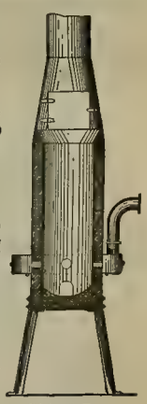

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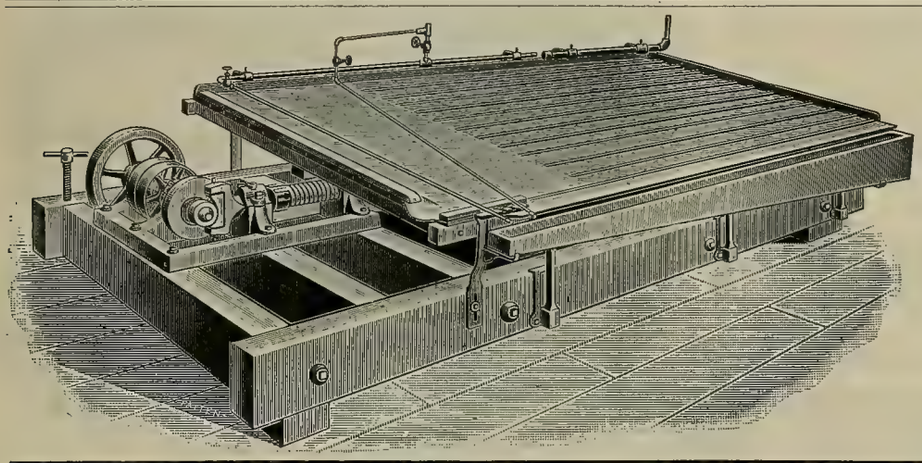

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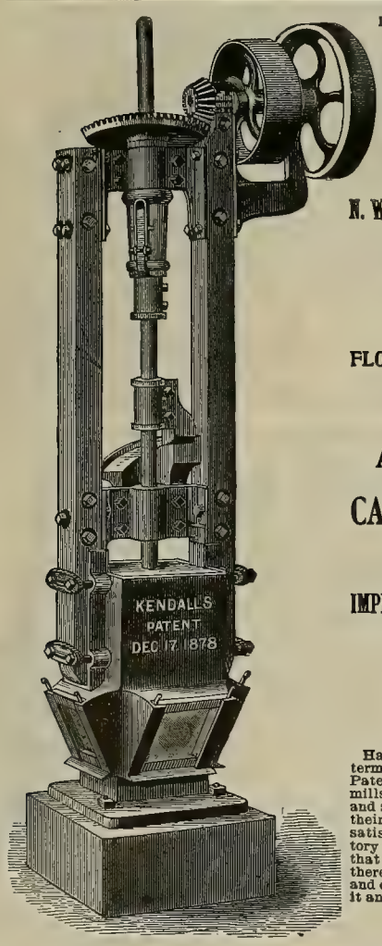

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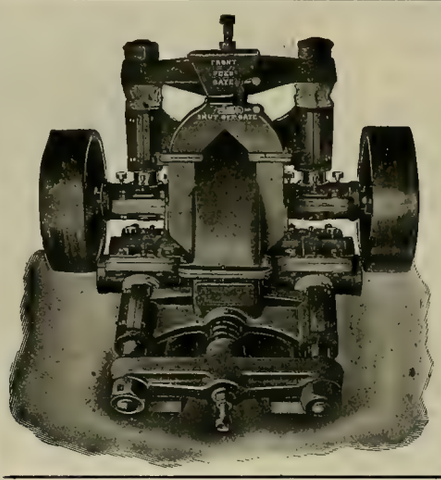

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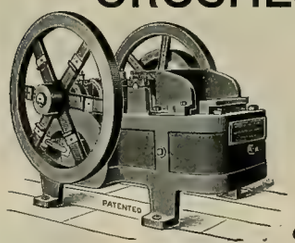

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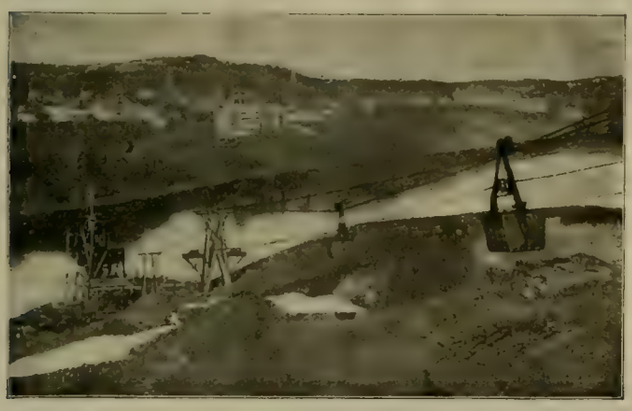

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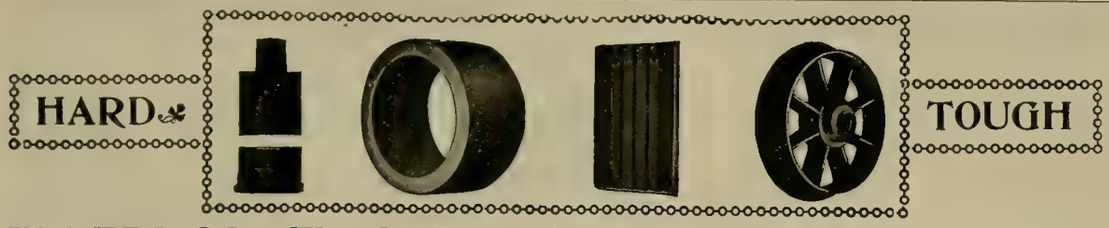

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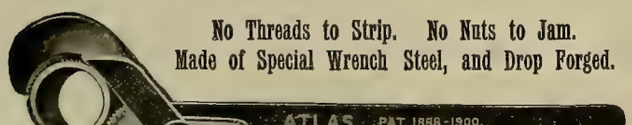

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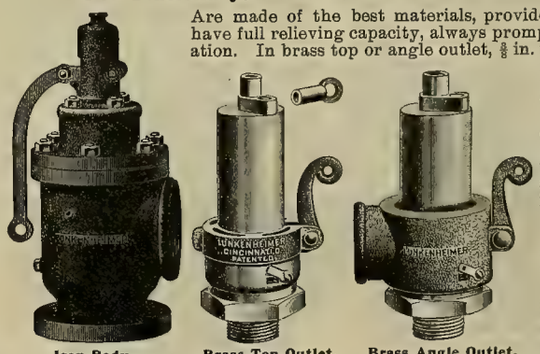

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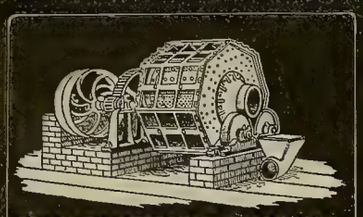

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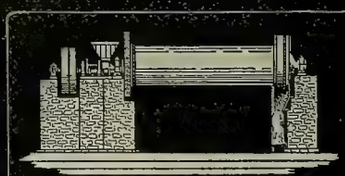

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225

ASSESSMENT NOTICES.

MARIPOSA COMMERCIAL AND MINING COMPANY.—Location of principal place of business, San Francisco, California; location of works, Mariposa County, California.

Notice is hereby given, that at a meeting of the Board of Directors, held on the 13th day of April, 1901, an assessment (No. 22) of Ten ($10) Dollars per share was levied upon the capital stock of the corporation, payable immediately in United States gold coin, to the secretary, at the office of the company, Room 223 Crocker Building, San Francisco, California.

Any stock upon which this assessment shall remain unpaid on the 25th day of May, 1901, will be delinquent, and advertised for sale at public auction; and unless payment is made before, will be sold on MONDAY, the 17th day of June, 1901, to pay the delinquent assessment, together with the costs of advertising and expenses of sale.

By order of the Board of Directors.

ALEX. GRANGER, Secretary.

Office—Room 223 Crocker Building, San Francisco, California.

EUREKA CONSOLIDATED DRIFT MINING COMPANY.—Location of principal place of business, San Francisco, California; location of works, Placer County, California.

Notice is hereby given, that at a meeting of the Board of Directors, held on the 25th day of April, 1901, an assessment (No 30) of one (1) cent per share was levied upon the capital stock of the corporation, payable immediately in United States gold coin, to the secretary, at the office of the company, 214 Pine street, room 31, San Francisco, California.

Any stock upon which this assessment shall remain unpaid on the 28th day of May, 1901, will be delinquent and advertised for sale at public auction; and unless payment is made before, will be sold on TUESDAY, the 18th day of June, 1901, to pay the delinquent assessment, together with the costs of advertising and expenses of sale.

By order of the Board of Directors.

GEO. W. DIXON, Secretary.

Office—214 Pine street, room 31, San Francisco, California.

NATIONAL CONS. MINING COMPANY.—Location of principal place of business, San Francisco, California; location of works, Rich Gulch, Shasta County, California.

Notice is hereby given, that at a meeting of the Board of Directors, held on the 16th day of April, 1901, an assessment (No. 14) of five (5) cents per share was levied upon the capital stock of the corporation, payable immediately in United States gold coin to the secretary, at the office of the company, 773 Mission St., San Francisco, California.

Any stock upon which this assessment shall remain unpaid on the 1st day of June, 1901, will be delinquent, and advertised for sale at public auction; and unless payment is made before, will be sold on TUESDAY, the 25th day of June, 1901, to pay the delinquent assessment, together with the costs of advertising and expenses of sale.

By order of the Board of Directors.

GEO. W. FLEISSNER, Secretary.

Office—773 Mission St., San Francisco, California.

OSCEOLA CONSOLIDATED MINING COMPANY.—Location of principal place of business, San Francisco, California; location of works, Plymouth, Amador County, California.

Notice is hereby given, that at a meeting of the Board of Directors, held on the 23d day of April, 1901, an assessment (No. 11) of one (1) cent per share was levied upon the capital stock of the corporation, payable immediately in United States gold coin, to the secretary, at the office of the company, 307 Montgomery street, San Francisco, California.

Any stock upon which this assessment shall remain unpaid on the 25th day of May, 1901, will be delinquent, and advertised for sale at public auction; and unless payment is made before, will be sold on MONDAY, the 17th day of June 1901, to pay the delinquent assessment, together with the costs of advertising and expenses of sale

By order of the Board of Directors.

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DELINQUENT SALE NOTICE.

LARKIN MINING COMPANY.—Location of principal place of business, San Francisco, California; location of works, near Placerville, El Dorado County, California.

Notice.—There are delinquent upon the following described stock, on account of assessment (No. 10) levied on the 12th day of March, 1901, the several amounts set opposite the names of the respective shareholders, as follows:

Names.	No. Cert.	No. Shares.	Amt.
T. W. Baker	201	250	$5 00
T. W. Baker	202	250	5 00
T. W. Baker	203	250	5 00
T. W. Baker	209	250	5 00
J E Kraffts	271	250	5 00
J. E. Kraffts	354	250	5 00

And in accordance with law, and an order from the Board of Directors, made on the 12th day of March, 1901, so many shares of each parcel of such stock as may be necessary, will be sold at public auction at the office of the company, 112 Main street, San Francisco, California, on WEDNESDAY, the 15th day of May, 1901, at the hour of 2 o clock P. M. of said day, to pay said delinquent assessment thereon, together with costs of advertising and expenses of sale.

N. F. REMINGTON, Secretary.

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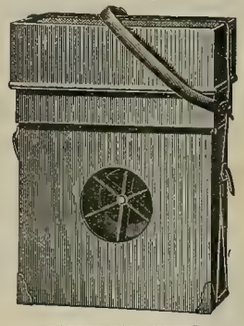

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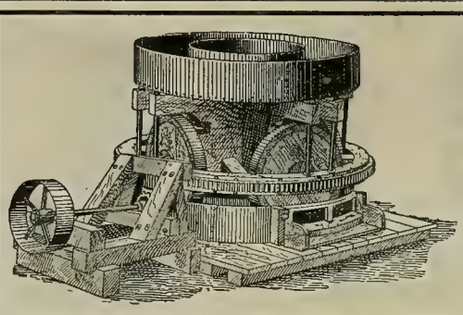

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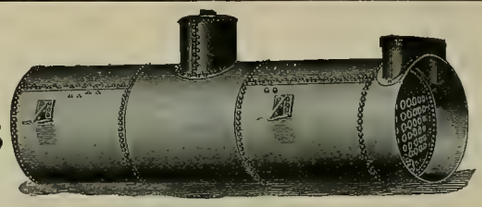

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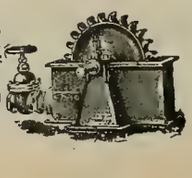

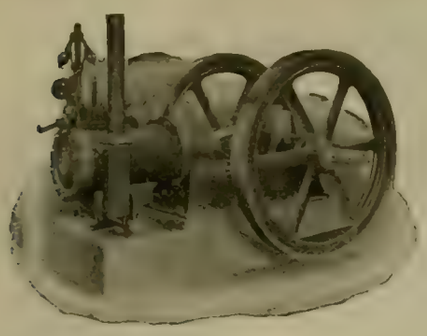

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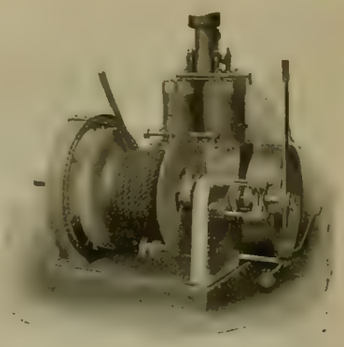

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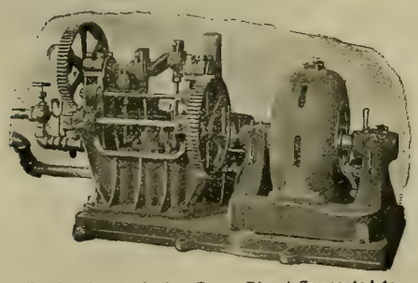

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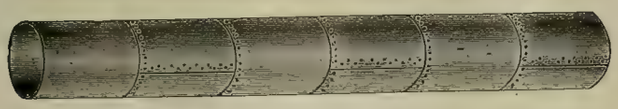

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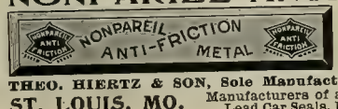

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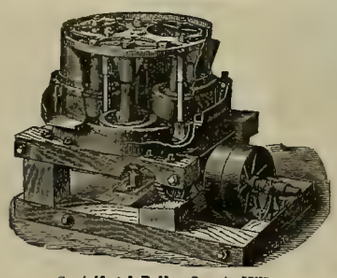

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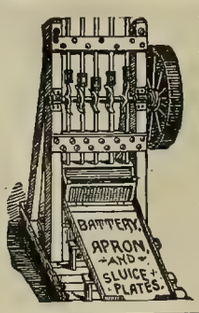

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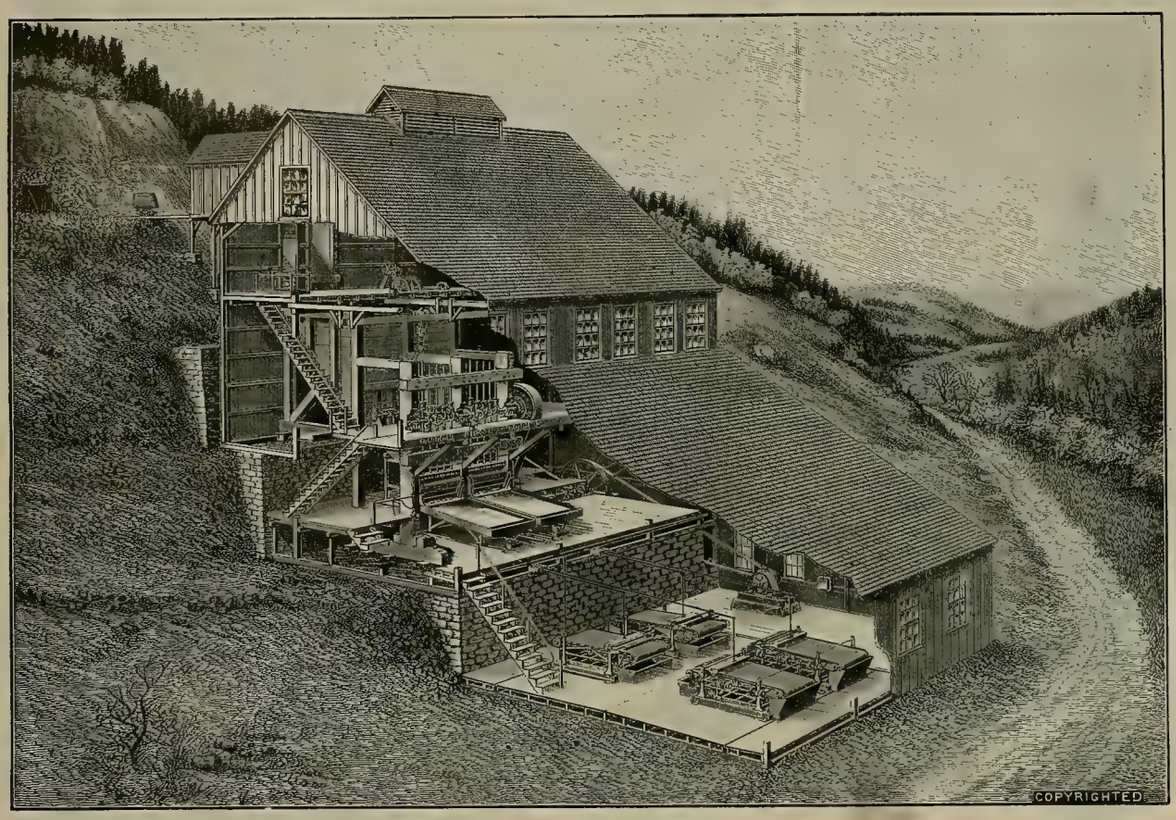

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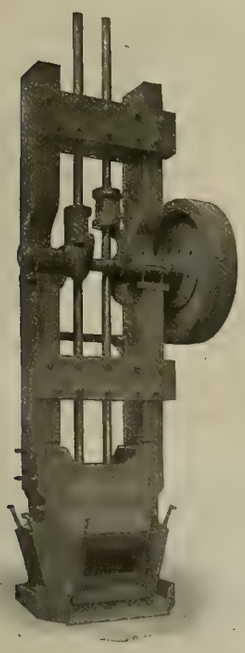

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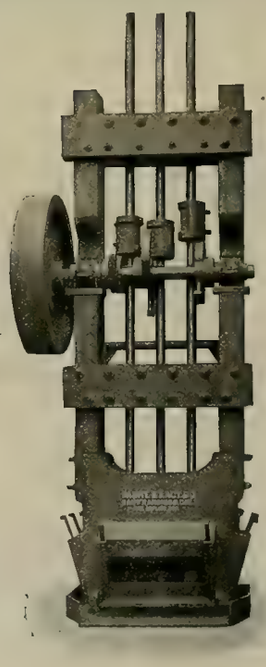

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Whole No. 2130. VOLUME LXXXII. Number 20. SAN FRANCISCO, SATURDAY, MAY 18, 1901. THREE DOLLARS PER ANNUM. Single Copies, Ten Cents.

Leadville Conditions.

Leadville, Colo., is going through an experience which nearly every mining camp of the West has had at some time. Railroad spurs were extended to mines which had been using freight teams. Fully three-fourths of the latter have been thrown out of employment and have no longer a place in the industry of the city. The extension of the railroad tracks to the mines has possibly increased the number of men employed in the mines, has possibly increased the output by permitting lower grade ore to be mined at a profit, and may have increased the mine owners' profit.

But Leadville, the community founded on the distribution to it of part of the product of the mines, finds that part diminishing. Where it was said to be $100,000 a month it is now said to be not more than $10,000 a month. Therefore, Leadville has not been benefited by the change from wagon to rail tracks.

The change in the means of transportation is an advance in transportation. It is a part of progress. It has come to stay. It is an aid to centralization, which means greater economy. But—and here is the point—this progress is not Leadville's progress, for so far as Leadville is concerned, it has moved the point of "centralization" from Leadville to wherever the elusive ownership of the rails may be from day to day. Changing the center point has changed the place of distribution of the product of the mines that Leadville had.

But why should not Leadville itself be the center, as before? The center of lines of spur tracks to the mines, as before the center of wagon tracks to the mines. The spurs were built for profit, to receive for the same kind of service as had been rendered by the roads the same kind of pay—a portion of the ore product of the mines. The aggregate received by the rail owners is at least an equal sum to that the freighters received. One more premise in this simple logic of Leadville's condition: If the sum earned by the rail spurs be distributed to the Leadville community, is not the industrial condition of Leadville at least equal to when it had the sum distributed by the freighters?

Certainly it is. And, novel as the conclusion may seem, the logic of it is unanswerable. Leadville should itself have built and operated the rail spurs to replace the freighters. Why not, when progress required it? Rails cost large sums of money! So do wagon tracks. Ore cars cost money! So do ore carts. Engines cost money! So do mules. Certainly they may cost more money, but just as certainly they earn more money, else the men who never see them would never have built them. Why should Leadville not then have done for herself what some unknown philanthropist has done for her?

Now, to replace some of what she has lost co-operative mining is proposed. But that only means another spur track to aggravate the existing undesirable condition. Better reverse it. Let the unknown philanthropist mine and Leadville take the tickets on the spur tracks.

Other cities have found it necessary to own the roads, railroads, as well as wagon roads, that they realized in time were the arteries of their industrial life blood. Chicago had to and did. All roads can not lead to Leadville as they were once said to lead to Rome, but the roads that center naturally on Leadville can and should be made to center there. The power exists in Leadville to compel them, but it must be accompanied by the disposition to use the power and the knowledge how to. It must see the real facts if it would use the real remedy.

These words have aimed to strip the situation down to its bones. They have a wider significance than their application to Leadville or to Leadville's particular kind of condition. The conclusion is alike for Leadville and other places and other interests that confront such a condition—do the thing the other fellow does, do it first, and keep on doing it.

Tonopah, Nevada, April, 1901—View Looking East. (See page 231.)

Tonopah, Nevada, April, 1901—View Looking West. (See page 231.)

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Old Records of Mine Operation.

A comparatively few years ago the States west of the Rocky mountains contained many abandoned mines, to which reference was then quite invariably made as unanswerable proof that mining was a failure. Later, many of these abandoned properties, on the credit of rich ore which had been mined during their early history, and a belief that cheaper and deeper mining would make them pay, were reopened. Some of them have since become such remarkably successful enterprises that the reopening of an old abandoned mine of good repute as to old ore values is regarded as a safer proposition than the exploitation of a newly discovered prospect.

Much of the difficulty incident to a decision as to the advisability of reopening has been found in the imperfect records of old operations. Maps and surveys are more or less fragmentary and incomplete, and there is rarely anything of the nature of connected descriptive writing that is sufficiently inclusive to take the place of the maps. Very often it will happen that there is nothing but the books of account and some boxes filled with the superintendent's letters.

In last week's number of this journal appeared a paper illustrating practically how the letters of a mine superintendent can be dissected and rearranged to make an intelligible and satisfactory mine history. The system has been practically applied to reducing several thousand letters written through a period of thirty years' continuous operation of a large mine. Such maps as existed were unintelligible, but the history prepared from the letters made it possible to construct maps correctly, showing all the mine workings during the thirty-year period. Very largely the stope blocks in the several levels were restored, so that both the character and value of the ore yield locally in the mine became known. It is suggested that the method illustrated can be profitably applied by the owners of old abandoned mines to assist in an expert examination of old records.

ON Wednesday, May 15, in the street intersection directly in front of the office of the MINING AND SCIENTIFIC PRESS, thousands of people witnessed the unveiling of the Donahue monumental fountain and its dedication to the mechanics of the city of San Francisco. It is a magnificent work of art in bronze. Mayor Phelan accepted the gift on behalf of the city, and Irving M. Scott of the Union Iron Works, the successor of the Donahue foundry, unveiled it and accepted it on behalf of the mechanics. President McKinley was unable to assist, as had been planned.

Miners' Association.

Colorado miners have awaken to the fact that all the industrial subordinate agencies that they pay out of the product of their mines, and, paying, provide with existence, have formed strong combinations that are practically monopolies. The objects of the combination are benevolent, so the promoters say; but their charity will undoubtedly begin in their own organization—and end there. If each of the combinations in its own line was independent of the other, the possible danger of the situation to the miners might be temporarily minimized. Each, to protect itself, would be compelled to ally itself with the mine owners as against the others. An increase in the share of any one of them from the common pot would mean a less share for some one or more of the others. The mine owner would come by his own, much as he has done in the past. The legitimate effect of the special combination would be to equalize the distribution of the total share of that particular combined industrial factor among its members, and to increase the amount available for distribution by eliminating or reducing its own wastes.

But each of the combinations is not independent of the others. They are all actuated by the community of interest principle, and, if the truth could be known, would almost certainly be found to have one common directing mind. There is, then, no balance of interest to be a protection to the mine owner. The equalization of the distribution of the respective shares becomes secondary to the increasing of the sum total by economies and reductions of wastes. Here is the location of the danger line to the mine owners. The associated combinations will act on what from their point of view is waste, and insist on a practical control of the output of the mines and on fixing the amount the mine owners shall be permitted to retain as profits. Meanwhile they will not assume any of the mine owners' risks in the mine.

A differentiating of charges by the associated service suppliers will produce the steady pressure at one or more points which will, cumulating, deprive the mass of the mine owners of the independence that comes from large profit-earning industry. From being the people who have employed men to work in the mine, who have employed other men and their transportation service to move ore or metals to points of consumption, and who have employed other men and their beneficiation service to reduce the ores and separate the valuable metal to make it available, they will become very largely the servitors of these original servants. Under nominal conditions, the efforts of mine owners are directed to the development of mines in which the ores will contain the largest possible total of valuable metal in the smallest possible tonnage. It costs no more to mine such ore than to mine any ore rock mass—if anything, it costs less. The cost of transportation of ore of concentrated value per ton is no more than the cost of transportation of worthless rock; it is simply moving a mass of matter a certain distance in a certain time. The cost of treatment of ores of concentrated value per unit of mass is no more—for the same percentage of metal content obtained—than for ores of small metal content. The effort for reduced costs of mining, of transportation, and of beneficiation, is normally to enable lower values of ore to be mined at a profit and to increase the profit margin on the higher ore values. The further this reduction of costs can extend, the more the risk of the business of mining to the mine owner is reduced.

To the associated combinations of transportation, beneficiation and trading factors, the normal tendency is to seek an increase in the quantities of ore at the expense of its quality. The flat costs to them being based on the unit of mass of ore, the more units the more profits. One hundred tons of $10 a ton ore means much more profit to them than ten tons of $100 ore. Naturally, then, they can be expected to favor the production of the lower grades of ore in preference to the higher. The ideal ore, from the standpoint of these associated interests, is the ore that will just pay extraction costs and transportation, treatment and trading charges, charges being inclusive of flat costs and profits.

Normally, if the quantity of metal produced, or the diminishing of consumption create an oversupply and lower sale prices, the mine owners would restrict the production to balance the demand by leaving in the mine the ore which at the reduced sale price would not pay a profit. The hundred tons of $10 ore would be left in the mine rather than the ten tons of $100 ore. The associated interests in transportation and beneficiation would certainly aim to restrict production from the other end, by reducing the production of the higher ore values. This they do when they make transportation charges and treatment charges higher per unit of ore mass where the ore contains high values than where it contains low values. It is from their point view an economy. It would be waste from their point of view to permit one ton of ore to supply to consumption the same quantity of metal that two tons supplies, and the economy consists in creating conditions which make the metal in one ton of ore no more profitable to the mine owner than the same quantity in two tons of ore.

The propositions have been very broadly stated to make them clear. Reduced to its simplest form, the business contest of control of the mining industry is a contest between the mine owners alone on one side, who desire to make profit from the metal content of the ore, and the several dependent industries, allied, which desire to make profit from the handling of the raw material. The miner desires profit from production, the associated other industries from service. It is simply a difference of name, not of fact, whether the service is that of a man working in a mine or of a machine working on the ore after it is brought to the surface.

The issue the mine owner confronts is whether he or the machine he has created shall be superior. Formerly the machine was his servant, now it would act as master. Divided, the mine owners are not a match for the allied service; the latter can overcome them one by one. Allied, it may be different. Therefore it is that this paper advises the organization of the mine owners and mine workers' end generally of the industry in Colorado and elsewhere. Organization is a necessary preparation for the inevitable contest. Not in the open, yet the conflict between interests just the same exists. Just as in a business way is it legitimate for the combination of transportation, smelting, selling and manufacturing, to attempt the regulation of production and maintenance of prices of metals at the cost of the mine owners, it is equally legitimate in a business way for the mine owners to regulate production and maintain prices of metals at the cost of the machine they employ.

The interests are not common, as might seem to a superficial consideration. It is well to realize this and govern action accordingly. To this paper it would seem as if a regulation of the quantity of metal production by a natural increase or decrease of the mining of the poorest grade of ore is preferable, from the consumer's standpoint, to a regulation by decrease of the mining of the higher grades.

It may be that a logical deduction from the preceding is that the mine owners should own the smelters, the transportation and selling agencies. Why not—particularly if, as otherwise, the effect of the associated combination will be ownership of the mines by them?

ONE of the directors of the American Smelting & Refining Co. has announced that that company (probably the Metal Selling Co. was meant) will establish banks in some of the Chinese cities to handle the American production directly with the Oriental consumers. This is directly in line with the suggestion this paper made a few weeks since. Aside from the profit of the direct disposal of the American silver production, the possible banking profits from discounts and exchange are enormous. The writer knows of one branch bank that earned in profits the first year of its establishment the full amount of its capital, a quarter of a million dollars. Manchuria, if thrown open for exploration, will prove an exceedingly profitable field for the operation of the silver selling banks.

GOVERNOR HUNT of Idaho has supplemented the invitation of Secretary Mahon to the Governors of the several States to appoint the delegates to the International Mining Congress at Boise with his own invitation, and has gracefully suggested that the Governors themselves come at the head of their respective delegations. The idea is excellent, and it is to be hoped that some of the Governors will be able to accept.

Concentrates.

THE consumption of zinc in 1900 was approximately 600,000 tons, an increase of 50% over the consumption in 1890.

AMBER is produced principally in Germany. Burma, in Asia, produces a small amount. Lumps weighing as much as 1000 pounds are found occasionally.

THE strongest iron-carbon compound is steel with about 1% of carbon, and tenacity decreases with either an increase or decrease of carbon from this amount.

PORTLAND CEMENT is made from calcium carbonate and clay, the ingredients being burned and ground and then bolted to screen out everything but the impalpable powder.

IT has been determined that the lead and zinc deposits of Missouri are deposited by ascending surface waters rising from or through deep limestones which have been dolomatized.

ALCOHOL will oxidize some metals and will dissolve a small amount. Copper is not affected, but tin, lead and galvanized iron in time become more or less oxidized. Lead enters into solution also.

IT has been noted that coal outcrops under the point of long, narrow ridges are thinner and of poorer quality than the same seam where exposed in the valley or ravine depression between the points.

NO PREMIUM has been offered to any one who invents a machine to scour the gold in the beach sands at Gold Bluff in California. But the beach is there, and the inventor can take it and work out a premium.

FRICTION is independent of the extent of the surfaces in contact, it is practically independent of the velocity when there is sliding motion and it varies with the pressure when the materials of the surfaces remain the same.

GERMANY is an exceedingly large consumer of copper and a comparatively small producer; in 1890 the consumption was 106,700 tons and production 31,930 tons—the latter a decrease of 5726 tons from the preceeding year.

LIQUID air as an explosive has been tested. Prepared somewhat as dynamite is, by saturating an absorbent, its explosive effect is about the same as dynamite, but volatization is so rapid when exposed to the air that the use of it is not practical.

SOMEWHERE between 2% and 3% of carbon in iron and an increase changes the description to be applied to it from steel to white cast iron. Steel and white cast iron in composition make an unbroken series from the softest steel, with .06% of carbon, to the hardest of white iron, with 4% or more of carbon.

BORT, the black diamond used in drills, is only found in Brazil. They are found with the gem diamonds in the gravels in the beds of streams and some are mined from land deposits (probably old stream beds) by tunnels. The supply is small, the native methods being crude and costly. The demand maintains prices.

CARBON exists in steel in two forms, graphite and cementite. The latter is a carbide of iron, Fe_3C, containing 6.57% of carbon. It is extremely brittle, harder than glass or hardened steel. It is the carbon of the cementite which is the combined carbon in the steel; the graphite exists in it as a mechanical ingredient, retaining its individuality.

THE solar spectrum is not the short rainbow color band so well known but extends far beyond its limits. A small part of this elongation has been known for a long time, the ultra-red as heat rays and the ultra-violet as chemical rays. In both directions the spectrum is now known to extend far beyond these limits and it is not known if the limit is reached yet.

THE method of working the frozen claims in the Yukon valley is by steam thawers. A small boiler is generally used, from which the steam is passed through rubber hose, to the ends of which pointed steel tubes about 4 feet in length are affixed. The latter are driven into the frozen gravel and steam is forced through them for six or eight hours. They are then withdrawn and the thawed material removed.

FERRIC SULPHATE [$Fe_2(SO_4)_3$] and ferric chloride [$FeCl_3$] will dissolve sulphide ores. Tests made with the latter showed that calcocite would dissolve readily, bornite somewhat slower, pyrrhotite, chalcopyrite and pyrite in the order given, the latter, however, very slowly. A hot solution of ferric sulphate will dissolve chalcopyrite readily. The weathering of pyrite produces ferric sulphate, so that under natural conditions the solution can occur.

THE United States Consul General at Apia, Samoa, reports officially that he made investigations and has been unable to find any person having any knowledge of the existence of gold, silver, mica, nickel, tin or any other metal in Samoa. He says no persons named as constituting the Gold Mining Co. are in Samoa, that no vessels of any kind are engaged in transporting sands or ores to Sydney or anywhere else; in short, that all representations of gold or metal mining there are a swindle and a fraud.

IN British Columbia a miners' inch of water is still an indefinite quantity. It is described as the amount that will pass through an orifice ½ inch wide, 2 inches high, 2 inches thick, with 7 inches above the top of the orifice, and every additional inch shall mean as much as shall pass through the orifice extended horizontally ½ inch. It has been suggested that the definition be changed and made the same as now designated by law in several of the Western States.

WHEN a mine has become forfeit by reason of failure to do assessment work annually, all the improvements are forfeited with it, and the mining claim being relocated, the claimants have the right to the improvements. A mill would be an improvement that would become forfeit. If the mill which had been used in connection with the mine was built on a separate millsite location it would not become forfeit by failure to do assessment work on the mine, and could not be located or claimed with the mine. The mill on a millsite claim is the property of the builders till it is abandoned. The payment of taxes is evidence that it is not abandoned.

THE most contradictory reports continue to come of mines or possible mines in the Philippines. They can with some reservations be boiled down to this: Working prospectors who have got out into the mineral bearing country, and who have themselves tested the ground, bring generally favorable reports as to extent of the mining area and its value. Those who have merely prospected Manila and the local sources of information make unfavorable reports. Against the latter it may be noted that the so-called sources of information are more exactly sources of misinformation, and natives of the far east generally possess a disposition to tell the questioner just what they think the questioner would like to be told.

IN a four-cycle gas engine it takes four strokes or two complete revolutions before it repeats. First the piston moves out and draws in its charge of mixed gas and air at atmospheric pressure. On the return stroke it compresses the charge in the clearance space. Then ignited the pressure and temperature suddenly rise and the piston moves out as the burning gases expand. On the return stroke the exhaust valve opens and discharges the burned gases. In the two-cycle engine the air and gas mixture is first compressed and made to drive out the waste of the previous explosion while the piston is out at its dead center. The waste valve closing the mixture is then again compressed and exploded at the end of the in-stroke, thus repeating with every revolution.

LIEU LANDS are lands which may be taken in exchange for, or which are taken in exchange for, other lands to which for specified reasons the U. S. Government finds it desirable to regain its title after a private claim has attached by operation of law. In some cases a designated reservation has been made to provide lieu lands for possible exchangers who have land the Government wants. This land—reserved to become "lieu" land—can only be agricultural land. Mining claims are located on it. It does not become "lieu" land till taken by some claimant in exchange. Until title is confirmed it is locatable if a mine be discovered on it. Generally one having the right to "lieu" land is granted the right to select it anywhere in the public domain not otherwise claimed or occupied. The selected land then becomes "lieu" land. It is subject to location if a discovery of mineral of value be made on it. The mere selection in exchange would not protect the exchanger in the ownership of a tract of land to which he could not get agricultural patent directly under the homestead laws.

THE increased development of water power involving the construction of costly pipe lines has made the methods of preservation employed of importance. The rule of thumb method is to dip the pipe in some approved bituminous preparation, coating inside and outside, and letting it go at that. A better way is to begin with the planning of the pipe. This should be given a diameter such that the velocity of flow of the water through it should be low—3 feet a second is a reasonable maximum. The object of this is to reduce the wear on the interior covering of the pipe. Incidentally, it increases the effective working head by reducing the head consumed by friction. The pipe should be provided with a number of conveniently disposed manholes and should be of sufficiently large diameter to admit a workman to recoat it from time to time. Practically complete protection against corrosion can be given to the inside of the pipe. The possible deterioration is thus limited to the outside. Where the pipe is buried a renewal of the outside coating is impracticable, though possible. Bituminous coating is not costly, and the preferable method of protection would seem to be to make the outside coating thick and specially resistant in the first instance. After giving to the pipe the dip coating inside and outside, the outside could be subjected to a second coating, increasing the thickness. This could be effected by taking the pipe after the dip had cooled and hardened, closing the ends with temporary shields, and then turning it on the surface of a kettle of dip so as to receive a sort of shell wrapping of the dip, giving it an additional thickness. With the greater thickness of dip there should be more care in handling it into place in order to preserve the coating against being broken.

SORTING ore that is to go to a wet-crushing stamp mill is practically a question of comparison of costs, in which are included comparison of ultimate losses. The latter may be the more important factor. Milling costs with large mills are so low that it is apt to cost less to crush one ton of waste rock than to handle two tons from which half is sorted out and discarded. The discarded part, however, carries some value, and the final tails contain some unrecoverable values. By not sorting, this final loss is apt to be increased in the aggregate over the sum of the metal value in the sorted out waste and in the final tails from the limited milling. The sum of this extra loss and the extra milling cost is then to be compared with the direct cost of the sorting. If the tails from the stamp mill are subsequently to be treated by cyanide or other lixiviation process, there remain to be added to the extra loss and extra direct milling cost, the cost of handling the portion that would be sorted through the cyanide process, including the loss of chemical which is always directly as the quantity of ore treated. It is clear that where there is treatment after passing the stamp mill the costs of treatment of waste may cumulate to a point that will make hand sorting economically desirable. Where crushing is only followed by concentration the comparison of costs and losses would probably show the balance on the other side. The choice is one of the practical problems that come up when the question of a scheme of treatment for the product of a mine must be decided. It is not answered by the bare statement that the crushing is cheaper than the sorting. The practice in the Transvaal of sorting the ore coming out of the stopes and rejecting a considerable fraction that contains over a dollar a ton is based on the ultimate costs as determined by the line of consideration suggested.

THE formation of conglomerates is generally explained by the statement that they are sea beach deposits. The explanation is simpler than the phenomenon. A bed of conglomerate, or several beds, will be found sandwiched between layers of sandstone from a few inches to several hundreds of feet thick. The sea beach is the cutting edge of the sea. It undermines land surface but does not dig down into depths beneath the sea surface. Ocean currents wearing against solid rock do not tear off fragments. At the most they may wear some rock surfaces by moving sharp edged sand. The cut and rolling force of the waves may explain the formation of the cobbles, rounded pebbles and rock fragments which compose the conglomerate but they do not explain the enormous areal extent and thickness of the deposits nor do they explain the sorting out and bedding of the material. It is suggested that the origin of these beds is not so much the cutting edge of the sea at its margin as it is the erosion of the land waters—the erosion of the rivers and all their branches. There is no question but that the areas of rock surface exposed to such action are many times the extent exposed to sea cutting. And there is no question about the transportation, the spreading areally and enormous accumulation in depth that is done by the land waters. The phenomenon of sorting and stratification is readily comprehensible with stream-born deposits. There are no such limitations of current intensity with stream waters as exist with sea currents. In torrential activity a stream moves along its bottom grinding and rounding both the small grains of sand and the large rock masses. With the cessation of this intense activity the mass of solid matter stops unsorted. The mass may appear to the eye to be entirely composed of sand. Test it by screening and it will be found to contain an appreciable quantity of rock fragments, gravel and even cobbles. More or less gentle stream currents, relatively to the torrential activity in the intervals between the periods of the latter, naturally perform the screening. The lighter and smaller sand and silt grains are picked up and rolled on down stream, the heavier and larger gravel stones and rock fragments becoming successively undermined become lowered in place and accumulated until ultimately their mass forms a protecting cover against further undercutting and removal of the sand, the stream makes its temporary bed and base plane of cutting on these accumulated gravels. This rearrangement is accompanied with alteration of grades, in turn altering velocities and reducing or increasing the transporting power. It may happen that the sands and silts sorted out upstream may be deposited in mass on top of the gravels overlying the still unsorted mass of sand and gravel which to the eye would seem exclusively sand. In this stage a period of torrential activity cutting partially through the area of the successive accumulations, and entirely through their depth again moves sand and gravel alike onward down stream. The face of the cut in the bank shows underneath what appears to be a sand bed but is, as explained, not necessarily one, next a seam of gravel or rock fragments and finally a sand bed. All these are unconsolidated but the structure is identical with the alteration of sandstone and conglomerate beds described. The presence of marine shells in the sandstone beds is explainable. The illustration given is of the method not the place of formation. Regional subsidence and uplift have brought the land formed unassorted and unconsolidated masses beneath the sea surface and sea currents have made the sorting and layering of the gravels and sands. Alternations of uplift and subsidence, the latter predominating, would create the alternations of beds observed in the rocks. Depth and pressure would form the rocks from the unconsolidated beds. Examining in detail a conglomerate bed it will be noted that while the largest gravel stones have no rule of distribution the heavier of the finer particles are invariably concentrated at the bottom. This is noticeable as an economic factor in the so-called reefs in the Rand, South Africa. The gold is not uniformly distributed through the mass of the banket but is concentrated in the bottom so that only the bottom 30 inches or thereabout are removed and mined. The formation of the auriferous black sand beds is in the manner described, and it is the mode of formation of the Transvaal gold-bearing banket as well. The latter has been through one more stage of rock history metamorphism.

The Original Source of the Heavy Metals of Ore Deposits.*

By PROF. J. H. L. VOGT, University of Kristiania, Norway.

It is well known that many investigators, even in most recent years, have sought to derive the heavy metals of ore deposits from the inaccessible interior of the earth. This hypothesis was favored by the remarkably high specific gravity (about 5.6) of the whole globe, which was explained by assuming that the heavy metals were concentrated in its interior. A further confirmation was sought in the quantity of iron found in meteorites, and also (by spectral analysis) in the sun. The earth's interior was regarded as a liquid molten mass, and the products of volcanic eruption as furnishing samples of this mass, bringing with them, from the richly metalliferous hearth of interior fusion to the upper horizons, or even to the surface, small quantities of metals and metallic compounds. In support of this hypothesis, the beautiful synthetic production, by sublimation, of cassiterite, specular iron, etc., performed by Daubree and other French experimenters in the middle of the ninteenth century, and received with universal and significant interest, has often been cited.

The hypothesis is seductively simple, but cannot be maintained. We must accept as now proved, that the interior of the earth cannot be regarded as a liquid molten mass. In the words of the distinguished Swedish physicist, Svante Arrhenius,

> Modern investigations of astronomers and physicists show that the deformations of the earth's mass under the influence of the moon and sun (tides of the earth's crust), and the variations of the earth's axis (called precession and mutation) due to the same outside causes, present such a quantitative order as to be irreconcilable with the assumption of a liquid interior.

He concludes that the crust of the earth is solid to the depth of about 40 kilometers. At the temperature of about 1200° C., and the pressure of about 10,-840 atmospheres, existing at this depth, most of the ordinary minerals are fused, and dissolve the less fusible materials. That is to say, at the depth of about 40 kilom. begins a liquid molten condition, which, however, cannot continue to much greater depth. For at about 300 kilom. the temperature must without doubt exceed the critical temperature of all known substances; and at this point the liquid magma passes gradually to a gaseous magma, subject to extremely high pressure. The viscosity and lack of compressibility of this gaseous magma may be greater than those of the liquid magma.

We must give up, therefore, the old conceptions of the earth's interior condition. There is no reason for supposing that the heavy metals of ore deposits have come from the enormously compressed earth interior—which, as some physicists declare, must be, in consequence of such compression, "as hard as steel." In fact, no connection has ever been shown between ore deposits and this heavy interior mass.

We are forced, then, to the conclusion that ore deposits are derived from the crust of the earth—this crust, however, being regarded as not 1 or 2, but 10, 25 or even 50 kilometers thick. Indeed, as will be shown below, a notable number of ore deposits may be referred to eruptive processes connected, not with the heavy interior, but with the crust, of the earth. Many deposits, as Van Hise has recently shown, are due to the action of ground water.

Moreover, it has been shown within recent decades that many elements, formerly regarded as very rare —often as totally absent—in rocks, are in fact almost invariably present in detectable (though, of course, generally minute) quantity. On this point I may mention the investigations of the American chemists, F. W. Clarke and W. F. Hillebrand, and also my own paper on the relative distribution of the elements, etc., from which I here introduce a brief passage.

DISTRIBUTION OF ELEMENTARY SUBSTANCES IN THE EARTH'S CRUST.—Of the entire earth crust—namely, the rocks, sea and atmosphere—oxygen constitutes by weight about one-half, and silicon about one-quarter; the proportions of aluminum, iron, calcium, magnesium, sodium and potassium range from 10% down to 1%; those of hydrogen, titanium, carbon and chlorine from 1% to 0.1%; those of some eight elements, phosphorus, manganese, sulphur, barium, fluorine, nitrogen, pretty certainly also zirconium and chlorine (but probably no others, with the possible exception of strontium), from 0.1% to 0.01%. Between 0.01% and 0.001% come nickel, strontium (?), lithium, vanadium, bromine, and pretty certainly also beryllium and boron, but probably not tin, cerium and yttrium, or other elements. Between 0.001% and 0.0001% are cobalt, argon, iodine, rubidium, pretty certainly tin, cerium and yttrium, and possibly also arsenic and lanthanum, but probably no others. In summary, therefore, we have:

TERRESTRIAL DISTRIBUTION OF GROUPS OF ELEMENTS.

Percentage.	No. of Elements.
10 to 1	6
1 " 0.1	4
0.1 " 0.01	8
0.01 " 0.001	7
0.001 " 0.0001	7

Similar figures are obtained for the intervals 50% to 5%, 5% to 0.5%, 0.5% to 0.05%, etc., proving that there is a law of quantitative distribution of the thirty-four most widely occurring elements, according to which some four to eight elements fall within each decimally reduced interval. From this law we may with some confidence further infer that of the total of, say, thirty-seven known elements, some would fall within the next following smaller intervals, for instance, between 0.0001 and 0.00001%, or between the latter and 0.000001%.

It may here be noted that all the more widely distributed elements (O, Si, Al, Fe, Ca, Mg, Na, K, H, Ti, C, Cl, P, etc.) have relatively small atomic weights. The twenty-five elements having the lowest atomic weights (up to and including iron) constitute at least 99.8% (more probably 99.85% to 99.9%) of the earth's crust, while the remaining (say) forty-six elements (among which barium, strontium, nickel, etc., are the most widely distributed) make up a total of 0.1%, or at most 0.2%. This is a result, on one hand, of the laws which controlled the formation of the elements themselves, which are probably to be conceived not as original and simple substances, but as compounds; on the other hand, of those which controlled the formation of the earth crust from the original fire-mist of Kant and Laplace.

The elements of highest atomic weight are, then, on the whole, relatively the rarest in rocks; but that they do exist therein, though in minute proportions, and doubtless in some rocks as original constituents, may be shown, by way of illustration, for the platinum metals.

These metals are found here and there—often together with segregations formed by magmatic concentration, in very basic eruptive rocks (peridotite, and, as reported in only one locality, highly basic olivin-gabbro)—a fact which clearly indicates their original presence in minute proportion in these rocks. Moreover, in recent years a small proportion of platinum metals has been found (as at Sudbury, Can., and Klefva, Sweden) in the segregated sulphide ores of gabbro rocks—a fact which requires the supposition that that the gabbro magma originally contained them. Some conception of this original tenor of platinum metals may be formed from the statement that the nickeliferous pyrrhotites of Sudbury contain, according to many analyses, from 25,000 to 90,-000 times as much nickel as platinum metals; while the original proportion of nickel in the gabbro magma may be set down as about 0.05%. Hence, on the (somewhat arbitrary) assumption that the platinum metals were concentrated from the magma to the same extent as the nickel, the magma contained, roughly, 0.000001% of these metals. This figure, of course, has no pretension to accuracy; but we have at least learned that the platinum metals are among the normal constituents of the basic eruptive rocks.

It can be similarly shown that minute quantities of gold and silver belong in eruptive magmas. For further discussion of this subject, and of the relative concentration of certain elements into the acid, and of others into the basic eruptives, I refer to my treatise cited above.

* Extract from paper Trans. Am. In. M. E., Feb., 1901.

Alaska Transportation in Winter.

Two illustrations on this page illustrate the novel transportation facilities of Alaska. The dog team shown sledding a boiler to a placer claim is too common a sight to be a novelty either at Atlin, where the view was taken, or in the Klondike. The sleigh ride behind the reindeer at Nome is new in Alaska. Except at Cape Nome and Port Clarence, the experiment of introducing reindeer has so far been a failure, and it is only this winter just past which has afforded much opportunity for their use at these places.

A Reindeer Sleigh Ride at Nome, Alaska.

Hauling a Boiler by Dog Team at Atlin, B. C

Tonopah.*

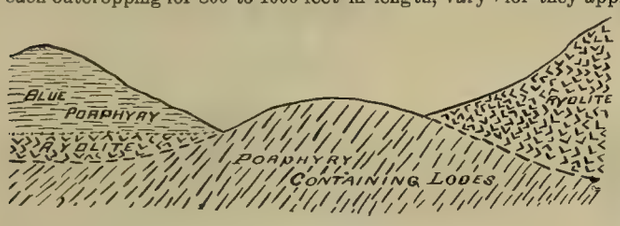
Written for the MINING AND SCIENTIFIC PRESS by S. A. KNAPP.

The new mining district, Tonopah, literally "water brush" in Shoshone, which is now attracting so much attention on account of the richness of its ores and the considerable amount being shipped, is situated near the line between Esmeralda and Nye counties in Nevada, which county can claim it not being as yet positively determined. It is about 60 miles south of east from Sodaville, Nevada (whence two stage lines run), about the same distance east of Candelaria, about 40 miles east of north from Silver Peak, about 50 miles south of Belmont, and is situated at an elevation of about 6000 feet, in the low foothills, on the western slope of the southern end of the San Antone range of mountains, where they break in long, easy slopes down to the San Antone desert. The San Antone range of mountains is in this locality broken up into a series of isolated buttes and short, sawtooth ranges, and show many evidences of extensive volcanic action and great chemical activity.

The ledges were first discovered by J. L. Butler of Belmont in June, 1900, and so unpromising was the appearance of the ledges and ore that tests and locations were not made until in August, 1900. When assays were made, to the surprise of all it was shown that this unpromising looking hard quartz, with just a black streak of stain now and then, ran from 300 to 500 ounces silver and from $60 to $100 gold per ton.

Mr. Butler secured five claims, covering the outcrow showing, and perfected the same. The fact that rich ore had been found became known among the miners at Silver Peak and Southern Klondyke, and about November 1 a few went in and took leases. The assays obtained when work on ledges commenced ran so high that the news spread rapidly, and by January 1, 1900, about eighty men were at work, and since then the number has increased to 150, there being thirty-six different leases in operation, working two to ten men on each one, and the outside men bring the number in camp at this time up to about 225.

The ledges, of which there are eight now known, each outcropping for 800 to 1000 feet in length, vary from 1 foot to 5 feet in width, and in a few places are even larger, the average being about 2 feet, and run generally parallel, the course being northeasterly and southwesterly, and, with a few local modifications, dip nearly vertical. The walls of the veins are generally smooth and good, although occasionally there is no selvage. But little faulting is evident, and then only with small throw. The ore is a hard, compact, close-grained quartz, carrying gold and silver, the mineral occurring in streaks and ribbons throughout the vein material, the silver occurring as a remarkably pure silver sulphide—no zinc or lead—except in a few places where chlorides show, mostly as horn silver, and evidently a local enrichment due to leaching from broken and shattered portions of the veins. The gold is largely metallic, although in some portions there is reason to believe tellurides are present.



Sketch of Rock Formations, Tonopah, Nev.

The proportion of gold and silver is generally one ounce gold to 100 ounces silver.

In some portions of the ledges black oxide of manganese and iron replace the silver minerals, and, owing to the similarity in appearance when so intimately mixed in the gangue, render it difficult to assort the ore closely. A careful sampling of this entire outcrop and series of ledges, so far as opened, shows the mass to average a little over 100 ounces silver and about $20 gold per ton.

The assorted ores shipped by leasers run up to 400 and 500 ounces silver and $100 gold, and samples taken run several thousand ounces silver and proportionately in gold. The high cost of shipment and reduction—$43 per ton, 90% returns—precludes the handling of any ores much less than 100 ounces silver and $20 gold per ton, and the second class ore now being piled on dumps by leasers shows averages of 50 to 80 ounces silver and $12 to $15 gold per ton. This is awaiting the advent of local reduction works.

The work thus far has mostly been done by leasers, 100 feet along the ledge being the usual form of allotment, and as the topography of the country does not admit of much tunneling the work has been done in open cuts and small shafts, several of which are down 50 to 55 feet.

The formation enclosing the ledges is porphyry, and in proximity thereto is seamed and fissured considerably, and in many instances carries considerable value.

Outside the area covered by the Butler claims and a few other locations, which has apparently been exposed by denudation, the original formation—porphyry enclosing the ore-bearing veins—appears to have been covered by two later porphyry flows, the first being a flow of rhyolite, the second a blue porphyry, which in a number of places is found covering the rhyolite, the exposures in various places showing this condition, and there is considerable reason to suppose that prospecting and opening the ground will show that the area containing these rich ledges is more extensive than at first supposed. Water is in limited supply, a small spring supplying the needs of the camp. A well 40 feet deep struck good water in the desert 15 miles west of the camp. At Desert Wells, 20 miles distant, considerable water can be developed.

Wood is scarce, it being 16 miles to the nearest supply of any consequence. The Columbus coal mines are 35 miles distant and may prove an important factor.

Notwithstanding these unfavorable conditions, the extent and high value of the ores will undoubtedly result in overcoming the same and the establishment of an important and profitable industry.

Hawthorne, Nev., April 25.

*See illustrations on front page.

Minerals of the Philippines.

TO THE EDITOR:—Prospectors have been coming to the islands from other countries as long ago as forty years. The principal gold mines were found in the provinces of Camarines Norte, and considerable metal was taken out. In recent years gold has been found in Mindanao and at the present time there are several mines operating there, some having modern machinery. The grasshopper eaters of Mindanao have for a long time been coming into the cities and towns with little nuggets of gold, which they traded for articles of food, wear and general supplies. The mountain tribes of Cimeras and Negros have also found gold in places and have managed to market some of it. The natives are very close about revealing the whereabouts of the mines, for they appreciate the value of a mine, even though they allow themselves to be cheated greatly when selling the product to others. Gold has been taken out in paying quantities at Tagsulip, Cuena, Misamis and on Panay the soldiers have found gold in the mountains in the interior.

There will be little done, however, in gold mining until quartz crushing machinery is put in. The natives, Spaniards and Chinese have taken and worked much of the surface or placer mines. There is, however, an opportunity for quartz mining, and lodes can be secured in many sections of the archipelago containing paying quantities of gold. Quartz veins have been located in Mindanao, Luzon, Panay, Negros and Cebu. For a time the Spanish government kept records of all mining enterprises and a large royalty of the gold mined had to be turned over to the king of Spain.

The former famous Mambulo mines produced at one time about 3000 ounces of gold monthly, the market price of which was about $20 an ounce. These old mines were worked by the natives long before the Spaniards came. Ultimately they passed into the hands of an English syndicate. The English failed to secure profitable returns from their investment. They employed the wrong kind of labor. The Spaniards, knowing the people of the islands, employed Chinese to operate the mines and made money. The English discharged the Chinese and put in natives, who would work a few weeks and quit until they spent the money earned. The native labor can be hired for 10 or 15 cents per day for mining work, but will not work steadily. The Chinese can be secured at practically the same rates and there are thousands of them available, but many foreign firms will not hire them. The writer has seen mines in which the labor is all Chinese, with Chinese foremen and white superintendents, and these mines are paying, while mines in which the labor is all Filipino are usually the reverse. The individual native miners depend upon finding pieces of the precious metal in the crevices in the mountains, and often months are devoted to a search which will result in the finding of a small piece of gold. One cannot remain in any portion of the islands long without hearing mining stories from natives and soldiers concerning the existence of placer deposits, and of streams the beds of which contain fine grains of gold. The sands of these streams when washed show color, oftentimes in paying quantities. Your correspondent has witnessed the washing of stream sands and on several occasions beach sand, with the result that payable gold deposits have been located.

COPPER.—For years it has been known that copper mines existed here. The writer has seen old Spanish mining records in Iloilo and in Manila referring to them. The copper mines located in the northern portion of the island of Luzon were worked by the natives 100 years ago. Since then they have been operated at intervals by natives, Chinese and foreigners. Many of the old mining operations failed to secure returns on investment, due to causes which do not now exist, so that some of these mines are at the present time in successful operation. They have a peculiar way of getting the copper deposits from the rock in some of these native mines. The Filipinos locate the veins containing the ore and then proceed to build wood fires on it, keeping the fires going until the heat softens the rock and permits the easy removal of the ore. They make crude smelting furnaces on the ground, of stone, small in size but effective. They get the necessary draft by using bamboo blowers. Copper has also been found in paying quantities in several of the principal islands of the southern portion of the archipelago. The Visayan group is already turning out some copper, mined by Americans and others, who expect some time to have mining machinery of modern type in operation, some having been ordered from the United States and Europe. Some of the newcomers desulphurize the copper ores by "heat roasting," or by putting them through reverberatory furnaces constructed in the shops of Iloilo. In the treatment the ore is crushed and rolled till very fine, and is put into furnaces. The product is a copper matte.

SILVER MINES.—A number of Australians and some capitalists from Montana have been in the islands prospecting for silver for several months. They have located what they claim to be paying claims on the island of Mindanao and are selling stock in Manila. It is stated that these new mining concerns will operate on a large scale. They propose to have the roads put into such shape that ore can be moved as desired. At present mining is seriously hindered owing to bad roads and lack of machinery.

COAL.—There has been a great need of coal in the Philippines for many years, the supply being foreign, except small quantities of poor quality from mines of moderate size which have been operated on the islands of the southern portion of the Philippine group. These coals are not suitable for steamship use. They are, however, available for use in the sugar refinery plants, oil works, artificial ice making apparatus, stoves, etc. Until recent years the native woods have been used, but many cooking ranges have been brought to the islands lately, and a large number of boilers and engines for wood working machinery. These require coal, except where the furnaces are specially fitted for wood burning. The result has been that there is an active demand for the coals of the local mines and the coal miners are making money. The cost of coal which is shipped here from other countries is very high, so that the native coals, which sell for about $2 gold per ton, have the market. The writer saw several mines in operation in which the coal was suitable for use, while in other cases the coal appeared to be more like clay than a heat producing substance. This clay-like coal burns, however, but it cannot be stoked or raked in the furnaces. It must be put into the furnace in one large lot and permitted to become ignited from the center, soon becoming fiercely hot. This coal is sold in sacks, being taken from the mines in sections where roads will not permit of wheeled vehicle traffic, so that the sacks of coal are brought to the markets on pack animals.

IRON MINES.—The Americans are not at all slow about locating the possibilities for mining in the Philippines, and several months ago a mining bureau was established in Manila in charge of United States army officers, who give all of their time and attention to promoting the systematic geological searches for iron and the precious metals. In this mining bureau one may see immense charts, on which are marked the locations of different claims, and as far as possible the proper owners have their names recorded. Where claims are in dispute the officials try to arrange a straightening out of the conflict. Old Spanish land grants are taken into consideration and everything possible done to further the interests of the proper owners of the mines and lands. The owners are numerous in some cases and the officers have had some difficult problems to decide. As to the iron mines of the archipelago, one official informed me that they had located an exceedingly rich iron mountain in the southwestern portion of Luzon, and expected to put in the proper outfit of machinery for working it as soon as it can be secured. The ores obtained from the iron mines in the vicinity of Angat, in the Bulacan district, are of superior quality. Specimens containing as much as 60% have been taken from the iron mines of Cebu. The Spaniards seem never to have taken much interest in the iron mines, and there is hardly a foundry in the Philippine group that is using iron of native product.

There are several good-sized foundries in each of the larger cities, such as Manila, Iloilo, etc., while in the several hundred smaller cities and towns I noticed that they had one or two iron or other metal working shops in operation. The natives are good workers of metals and are able to shape plows and all sorts of devices from the iron bars.

MAPS A GREAT HELP.—Parties proposing to engage in mining in the Philippines should first go to the mining bureau and look over the large array of maps of the different mining territories. One should not engage in mining in the Philippines without doing this, because he would otherwise surely get into trouble with original owners. Prospectors often locate a claim in the wilds of the jungle, where they

suppose that they are the first to tread, and are surprised later on to have some previous owner step in and present his claims. The original owner cares nothing for his neglected property until he sees Americans or others getting rich ores from the lands, and then he comes out of his hiding place and asks for a division of profits.

OILS.—Recently there has been considerable prospecting for petroleum. The new San Isidro plant on Luzon is doing an immense amount of business with its limited facilities and is obliged to keep its plant in operation twenty-four hours—day and night. Oils for illuminating purposes are very scarce and costly. The kerosene oils of the islands sell usually in small cans or bottles and at ridiculously high values. Some of the soldiers in the interior of Panay lately discovered oil wells and are planning to operate these wells when they get mustered out of the United States service. They have bought up the lands at very low rates and will use their muster out money, amounting to several hundred dollars, in providing an outfit. Recent orders to the effect that houses must have a front light at night has called for an increased consumption of oils, and the demand and price have both increased. PHILIPPINES.

Manila, P. I., March 28.

The Kellogg Tunnel—Bunker Hill & Sullivan Mines, Idaho.*

The tunnel known as the Kellogg tunnel is situated at Kellogg, Shoshone county, Idaho, and is being driven by the Bunker Hill & Sullivan M. & C. Co., for the purpose of developing a group of mines worked by them, and known as the Bunker Hill & Sullivan mines.

The mines up to the present time have been worked through tunnels upon the property; but as the ore on these levels and above is fast becoming exhausted, the necessity of hoisting and pumping, or driving a tunnel at some lower level, became apparent. The mill of the company is situated some 9000 feet from the mines, at an elevation of 800 feet below the lowest working level, the ore being conveyed to the mill by a Bleichert aerial tramway. It was therefore decided to drive a tunnel from the mill to the mine, thereby furnishing an outlet for the ore and drainage for the water, besides giving some 750 feet of stoping ground.

From the very outset the aim has been to make the greatest possible progress. The first difficulty encountered was the removal of waste material after blasting. Shoveling by the day and under contract was tried with but little difference in results. A single drum, double cylinder hoisting engine was installed, mounted upon a wooden frame, so that loaded cars holding 1 cubic yard of waste could pass under. A second wooden frame, with incline floor, was used just in front of the hoist. This frame was so arranged that two of the dump cars could be pushed under the end of it at the same time. A No. 1 scraper, or slusher, loaded with muck or waste, was hauled up this incline floor by the hoist to an opening in the frame over the car, when the scraper load was dumped into the car and the scraper returned for another load. Two scraper loads usually filled a 1-yard car, and never more than three were required. When the first car was loaded, it was pulled forward and the second car brought under the loading opening. When both cars were loaded, they were together pushed to a position on the track some 50 to 100 feet below, where the trains were made up, and two more empty cars from the siding were brought to be loaded. A section of the hoist frame and mucker frame is shown in the cut. Sufficient powder is used to break the rock, which is a quartzite, to a suitable size to be handled by the scraper.

Five men are employed at the removal of waste—one to operate the hoist, one to attend the dump cars, placing and removing, and three loading and attending the scraper. The time required to move 40 to 50 cubic yards of waste is two to two and one-half hours.

When it becomes necessary to advance the incline floor, or mucker, a car underneath the frame carrying four jackscrews, made from worn-out machine-drill feed screws, is used. The framework is jacked up until the entire weight is upon the car. The frame is then pushed back to allow the placing of new track. When the new rails are laid, the frame is advanced nearer the face of the tunnel, lowered to the floor, and is again ready for use. To move the hoist, a framework mounted upon a car truck is run under it, and four jackscrews, made from worn-out machine feed screws, are used to jack the entire hoist and frame from the floor, when it is ready to move forward. The time consumed in moving both hoist and mucker will not exceed twenty minutes for the five men. These frames stand the work well. Both the present hoist frame and the mucker have been in use for fifteen months and have been used to drive 3400 feet of tunnel. Both appear to be in fair condition.

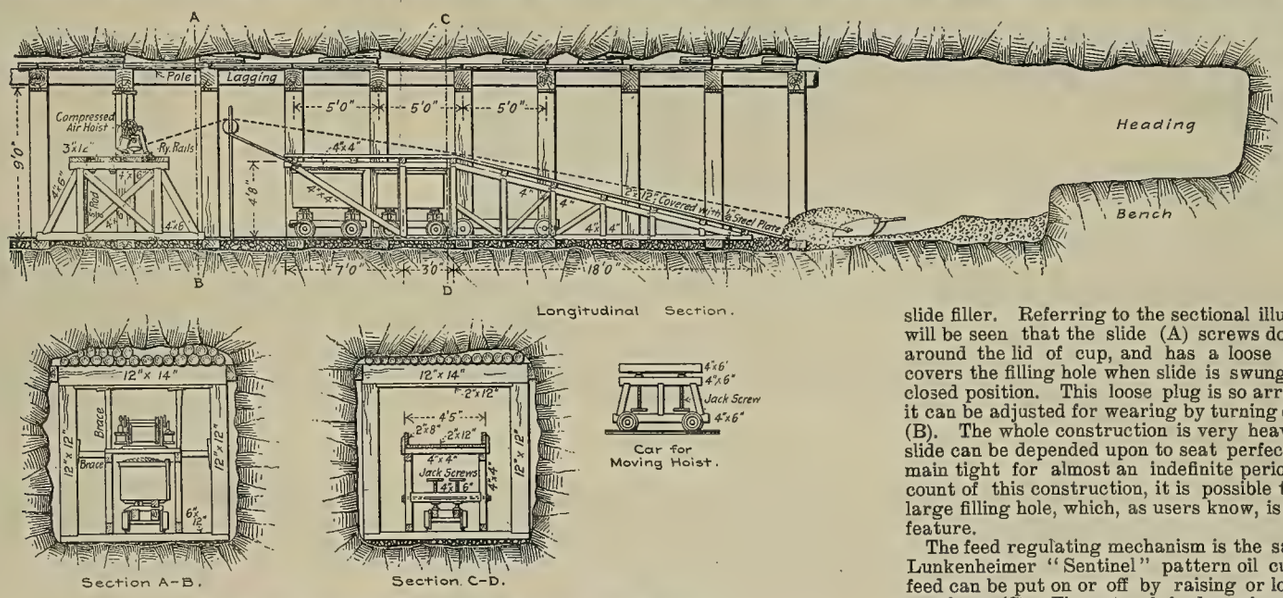
The drills used are the No. 4-A Rand air drills. Two machines are used at a time, both working upon the same bar. They are driven by compressed air at ninety pounds pressure, supplied through a 4-inch pipe from the air compressor supplying the mine. In untimbered ground a heading is driven 10 to 20 feet in advance, three rounds being shot in the heading to two in the bench.

All material and waste is handled to and from the tunnel by a General Electric motor, of four tons weight, running upon a track of 24-inch gauge. This motor hauls a train of fifteen loaded cars on an average, though as much as twenty cars are sometimes handled. The tunnel has a grade of 0.5% for the first half and 0.3% for the remainder. Rails of thirty pounds to the yard are being used. The track is single aside from the 200 feet of siding near the face, which is moved from time to time as the tunnel advances.

The smoke and gases are removed through a 22-inch galvanized iron pipe, made of No. 18 iron, by an exhaust fan. This fan, in fifteen or twenty minutes, will remove all smoke and gas after blasting to enable the men to return to work; and though the pipe is now over 8000 feet long, the time required to remove the smoke seems no longer than at first. This pipe is made in 18-foot lengths, and all seams are riveted and soldered. Where the lengths join, heavy sheeting is wrapped around the joint and painted with coal tar, so there is little or no leakage along the line. The fan is driven by a 24-inch Pelton water motor, working under a head of 300 feet. An auxiliary air engine is always in readiness in case of any accident to the water motor.

The progress of the tunnel has varied much on account of the variations in the ground encountered. In the month of October, 1898, an advance of 354 feet was made, being the most progress made in any one month. In February, 1899, an advance of only 53 feet was made for the month. In this month a considerable volume of water was encountered with running ground, and little or no progress was made for a week at a time. The average progress to the present has been 7.5 feet per day. It has been found necessary to timber about one-third of the tunnel.

On the completion of the tunnel and its connection with the mine, ore will be hauled to the mill by electric motors. From 800 to 1000 tons will be handled through the tunnel daily to supply the concentrator.

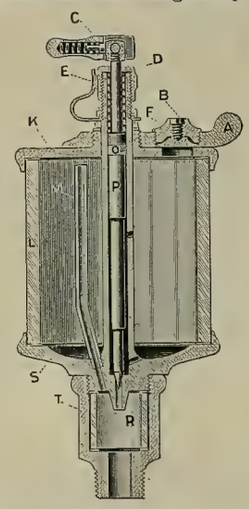


The Kellogg Tunnel, Bunker Hill & Sullivan Mines, Kellogg, Idaho.

ULYSSES B. HOUGH in Engineering News.

"Paragon" Gas Engine Lubricator.

The improved form of gas engine lubricator shown in the cut, which has been designed by the manufac-



turer, the Lunkenheimer Co. of Cincinnati, Ohio, under the trade name "Paragon," is claimed by them to adequately fulfill the requirements of the service for which it has been designed. Its construction has been improved and all objectionable features have been eliminated.

The filling arrangement consists of a screw-down slide filler. Referring to the sectional illustration, it will be seen that the slide (A) screws down on and around the lid of cup, and has a loose plug which covers the filling hole when slide is swung over to a closed position. This loose plug is so arranged that it can be adjusted for wearing by turning down screw (B). The whole construction is very heavy, and the slide can be depended upon to seat perfectly and remain tight for almost an indefinite period. On account of this construction, it is possible to secure a large filling hole, which, as users know, is a desirable feature.

The feed regulating mechanism is the same as the Lunkenheimer "Sentinel" pattern oil cup, and the feed can be put on or off by raising or lowering the cam lever (C). The rate of feed can be adjusted by turning nut (D), which is prevented from loosening by spring (E). By this arrangement the feed can be set and turned on or off without disturbing the rate of flow. The cup is thoroughly packed and can not become leaky. The whole cup is secured together by a patented lock-nut construction, making it impossible for the cup to jar apart, due to the shaking of the engine, and also dispenses with the annoyance of oil leaks. The sight-feed glass (R) is quite large and can be readily cleaned by unscrewing the upper part of the cup from the base piece.

AT the close of 1900 there existed in Mexico 10,000 titled mining properties, producing twenty-five different classes of metal. There were 8000 claims titled at the close of 1898. This is an increase of 25% in the last two years. The gain is principally in the States of Sonora, Durango, Zacatecas and Chihuahua. In the Moctezuma mining district, State of Sonora, nearly 1000 claims were denounced before the Agente de Minas in one year, but a greater proportion of these were not surveyed or titled.

THE discovery by Dr. Ludwig Mund of London of a new gas manufactured from coal is reported. It is stated the gas is useless as an illuminant, but valuable for heat and power development, costing only 4 cents per 1000 cubic feet, as compared with 60 cents for ordinary coal gas. Its use, it is declared, will change and cheapen methods of steel manufacture.

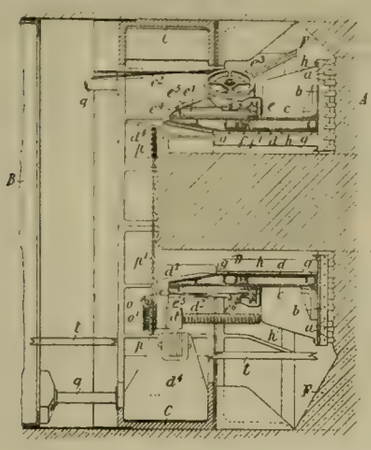
IT has been discovered that sand which fell in southern Germany during a recent snowstorm came from the Sahara desert in Africa.

Mining and Metallurgical Patents.

Patents Issued May 7, 1901.

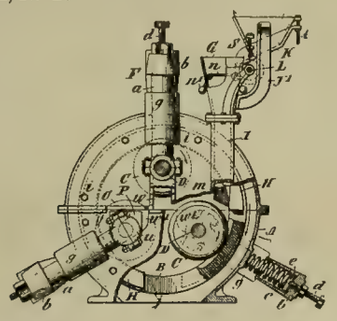
Specially Prepared for the MINING AND SCIENTIFIC PRESS.

APPARATUS FOR BORING TUNNELS.—No. 673,717; A. W. Manton, Wanstead, England.



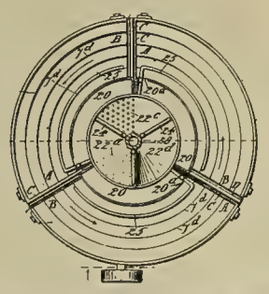
Combination of face plate carrying cutters, of cylinders to which face plate is fixed, of a fixed bearing upon which cylinder is rotatably mounted, of means for rotating cylinder, of screws fixed to bearing and mounted in nuts upon supports fixed in shield, tunnel or excavation, and of means, such as worm gear, for rotating screws.

PULVERIZING MILL.—No. 673,856; H. L. Kent, Brooklyn, N. Y.



Combination with a revolving ring movable radially, of plurality of crushing rolls within and encircled by ring, revolving on substantially stationary axes spaced apart at predetermined distances, two rolls being movable transversely of axes toward and from inner face of the ring, means for driving one of parts, a casing surrounding ring, bearings for rolls in casing, and springs reacting against movable rolls and casing for pressing rolls outwardly against inner face of ring, whereby pressure of either of movable rolls may be adjusted and ring can move radially in casing to adjust its position to proportionately distribute pressure to several rolls.

CONCENTRATOR.—No. 673,808; D. G. Wherry, Denver, Colo.



Combination of a number of table sections provided with curved riffles and movable about common center, sides of table sections farther from center of motion being lowest, each table section being provided with trough extending along end at one extremity of riffles, means located in central space surrounded by table sections for sizing material and discharging different grades to different table sections, and means for imparting to table a vibratory movement calculated to carry concentrates into troughs, while gangue is discharged over lowermost riffles at outer edge of tables.

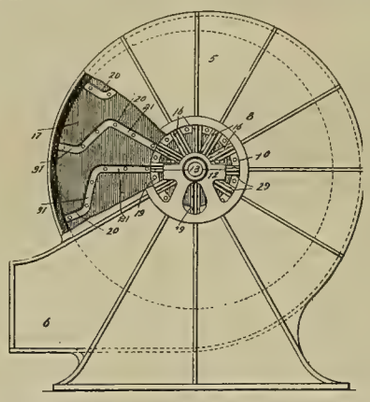
PROCESS FOR WELDING STEEL AND COPPER.—No. 673,664; T. Smith and F. G. Sherry, Pittsburg, Pa.

A process of welding steel to copper which consists in heating a steel plate to white heat, placing flux upon steel plate, placing a copper plate upon flux and steel plate, and then heating the two plates to welding heat and subjecting the two metals to rolls or hammer.

GOLD SAVING, PLACER MINING, AMALGAMATING AND CONCENTRATING MACHINE.—No. 673,806; G. C. Walters, Denver, Colo.

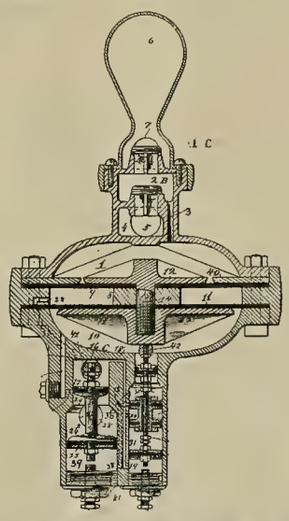
A trough or sluiceway having transverse riffles in its bottom, its side walls being composed of a series of wings curved outwardly from interior points, and merging into abrupt inward curves, each wing on same side terminating where wing immediately in front begins, wings having inclined sides overlapping interior of channel, and jutting points where wings unite being staggered on opposite sides.

FAN.—No. 673,477; J. R. Robinson, Monongahela, Pa.



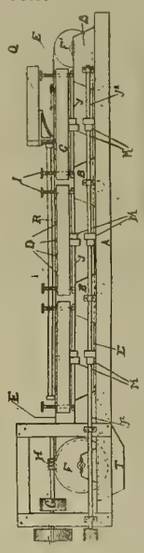
A casing having central inlet openings and peripheral discharge opening, a fan rotatably mounted within casing and including plurality of blades, flanges directed outwardly and forwardly from each of the blades at side edges adjacent to inlet openings, and end plates connected at side edges of blades beyond first-named flanges, each of blades including inner and outer portions lying radially of fan and relatively offset rotatively of fan and having a connecting portion.

DIFFERENTIAL PUMP.—No. 673,602; J. H. Fox, Cleveland, Ohio.



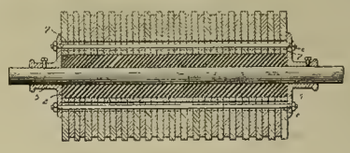
The combination with a chamber of flexible diaphragms secured transversely across, chamber including between them a chamber constantly filled with motive fluid under pressure, a ring about margin of one of the diaphragms, arranged to limit its area, central disks of different sizes secured to diaphragms and extending over effective area of diaphragms — a separator between disks, means for admitting to and withdrawing from side of diaphragm of largest effective area the motive fluid, whereby diaphragms are reciprocated, and a pumping chamber adjacent to diaphragms and inlet and outlet valve connected therewith, whereby fluid will be drawn into pumping chamber and expelled therefrom with each reciprocation of diaphragm.

ORE CONCENTRATING TABLE.—No. 673,489; M. P. Willits, Nederland, Colo.



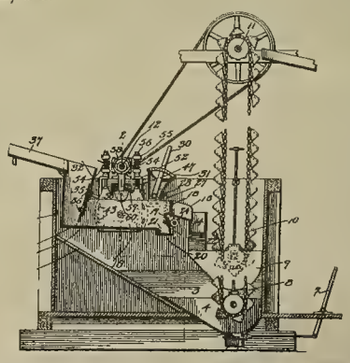
The combination with an endless belt of multiple jigging frames thereunder having an independent reciprocating motion, and screws O in castings N for regulating extent of reciprocating motion of respective jigging frames independently of each other.

CRUSHING ROLL.—No. 673,768; C. R. Fleming, Black Warrior, Ariz.



A pair of coacting crushing rolls, each comprising a shaft, a cylindrical core spring thereon, a series of disks on core spring, movable eccentrically with relation to axis of roll independently of each other, and core spring serving to normally retain disks concentrically with relation to axis of roll, each alternate disk being of greater diameter than intermediate disk, disks having transverse registering openings, heads secured on shaft and bearing against ends of core spring and outer disks, and bolt rods connecting heads and extending through openings, larger disks of each roll engaging smaller disks of the other.

ORE JIGGERS.—No. 673,607; A. L. Le Grand, West Pittston, Pa.



Combination of water tank, stationary guide plates fitted to opposite sides of tank, carrying slides slidably engaging with guide plates, a superposed driving shaft, reciprocatory supporting stems connected at their lower ends with the carrying slides and extending upwardly therefrom on opposite sides of driving shaft, supporting pan suspended between slides, normally compressed cushioning springs arranged in an elevated position and encircling upper end portions of stems at opposite sides of driving shaft, means for varying compression of springs, and driving mechanism having operative connections with slides.

MINING SUMMARY.

Specially compiled and reported for the MINING AND SCIENTIFIC PRESS.

ALASKA.

The April report of the Alaska Mexican M. Co. shows 13,198 tons ore crushed, yielding $16,251 and 245 tons sulphurets, valued at $5398, gross yield $21,649, an average of $1.87 per ton; expenses for the month, $22,934. Good ore is reported on the 300-foot level.

The report of the Alaska United M. Co. shows 25,876 tons ore crushed, yielding $42,991 and 546 tons sulphurets valued at $16,947, gross yield $59,938, an average of $2.31 per ton; expenses for the month, $40,215.

The board of signal officers has awarded the contract for laying the cable from Juneau to Skaguay to W. R. Brixie of New York at $70,000, the contract to be completed and the cable in operation on August 1. The U. S. signal corps will operate it.

A new town has been established 2 miles above Kluckwan, on the Chilkat river, near the mouth of the Klahena river, of which the Porcupine is an upstream branch. It is on the American side, but close to the boundary line and immediately south of Wells, in British Columbia, where two mounted police and the British government trail crew stop. The town has been named Troy. F. A. Kreuger has been made recorder and a petition for a postoffice and mail service has been sent to Washington. A ferry is to be put on between Troy and the mouth of the Klahena river for transporting freight and passengers. There are about forty people making Troy their headquarters now, and the number is being added to daily by new arrivals.

ARIZONA.

COCONINO COUNTY.

The contract for a $40,000 leaching plant for the Coconino M. Co. has been taken by Dederichs & Burke, construction to begin at once. The mill is to have 100 tons daily capacity and the contract requires completion by Aug. 15.

GILA COUNTY.

W. B. Collom has bonded the Golden Wonder mine, near Payson, from Chilson Bros. The mine was opened more than twenty years ago and has been worked, yielding a large amount of gold, the ore being crushed in an arrastra.

YUMA COUNTY.

The Darius G. M. Co. of Tucson has bonded some placer claims at Monitor and will begin work at once; C. Fleming of Tucson is manager.

CALIFORNIA.

AMADOR COUNTY.

The Rising Star G. M. & D. Co. has been incorporated, capital $300,000. The officers are: W. E. Holbrook, president; L. F. Kaskell, secretary, San Francisco; The First National Bank of San Francisco, treasurer; H. P. Gordon, general manager. The company own the Rising Star group, situated at Plymouth, on mother lode. They propose to sink a double-compartment shaft 1,000 feet, cutting stations from the 500-foot station down, to explore and develop the vein.

BUTTE COUNTY.

The Carlyle mine at Forbestown is being pumped out, and is to be worked this summer. The Miller mine is about to be reopened. The Gold Bank mine is working more than a hundred men.

CALAVERAS COUNTY.

The capital of the Melones G. M. Co. has been reorganized. The number of shares has been changed from 200,000 to 400,000, and the par value has been reduced from $10 to $1; $400,000 6% seven-year bonds, callable at par, is being underwritten by Boston and New York financiers. The stockholders will be given the option of subscribing for the bonds at par, with a bonus of 100 shares of treasury stock for every $1000 bond. The company holds at the present time 235,000 shares in its treasury, leaving 165,000 shares outstanding. The money from the bonds will be expended in building a mill.

W. F. Hendsch of Copperopolis says the Union copper mines, at Copperopolis, have been bought by Mrs. Hettie Green of New York; work will be commenced at once.

The Jones mine, at Glencose, is bonded by a Boston company, who are preparing to start up; men are engaged in cleaning out and retimbering the shaft, preparatory to erecting a hoist.

It is said the Mokelumne M. & D. Co. have made two large cleanups from their dredging claims, located 20 miles east of Lodi.

EL DORADO COUNTY.

At the Gentle Annie mine, near Placerville, the new incline shaft is down 200 feet. Hoisting works, a 20-stamp mill and a water power air compressor plant are all under construction.

E. W. Wilmer has bought a tract of land near Placerville for the purpose, it is said, of manufacturing Portland cement.

KERN COUNTY.

J. G. Larrick has bonded a three-fourth interest in the Hard Cash mine, near Randsburg, to B. McAnear and others for $1500. It is low grade and can be made pay by hauling and crushing at custom mills, but they are experimenting with the ore on the ground by cyaniding after being put through coarse crushing.

The Butte Lode M. Co. has been enjoined by C. E. Ferris and wife, who own the Philadelphia claim, adjoining. They claim that the Butte people since July 1, 1900, have removed ore valued at $10,000 from the Philadelphia.

NEVADA COUNTY.

George Levinsky of San Francisco, one of the parties bonding the California mine, says they will soon commence work and will put in machinery.

The lower tunnel in the Erie mine at Graniteville has cut the ledge. The ore body is said to be 30 feet thick and sprinkled with gold. There are 660 feet of backs over the tunnel, and it is believed that ore enough will be developed to keep the 20-stamp mill running steadily.

A crushing from the Keystone mine at Nevada City has yielded an average of $7 per ton. The shaft is now down 140 feet.

The annual stockholders' meeting of Maryland G. Q. M. Co. has been held in Grass Valley. S. P. Dorsey was elected president and superintendent, and L. N. Dorsey secretary and treasurer.

A. Nihell proposed to build a ten-stamp mill on one of the Clark mining claims in Meadow Lake district. Captain Ord of Benicia, Cal., is manager of the company.

The Anti-Debris Association has enjoined the Sargent mine at Quaker Hill. The mine is owned by G. C. Sargent, and has been operated for some time past under a permit from the Debris Commission.

PLACER COUNTY.

The Shady Run Q. M. Co. are preparing to build a 10-stamp water power mill. The shaft at the mine is 140 feet in depth. A tunnel connecting with the shaft extends 235 feet on the ledge, which crosscuts show to be from 20 to 32 feet wide.

A. W. Hutchins and other capitalists are developing the Sellier Con. gravel mine, adjoining the Hidden Treasure. The tunnel is now in 1000 feet.

The Washington G. Q. M. Co. has let a contract to W. S. May of Grass Valley to construct a 20-stamp mill at their quartz mine at Bath.

PLUMAS COUNTY.

It is said that the Sierra Valley Railroad, lately bought by the Southern Pacific, will be extended down the Feather river to a connection with the roads in the Sacramento valley.

SHASTA COUNTY.

It is reported that the company which last year bought the John Wright group of mines, near Igo, intend to put in an air compressor plant on their long tunnel.

The smelters at Bully Hill have been blown in and the plant will now be worked continuously. This is the second big copper smelter to be put in operation in this county.

SIERRA COUNTY.

J. Clinton and others are driving tunnels on the Rainbow mine at Alleghany.

The Pilgrim, near Alleghany, T. A. Patteson Jr. manager, is running a tunnel to reach the vein at greater depth. It has been worked to the surface from the old tunnel, and it is believed that when the new tunnel reaches the ledge the company will build a mill to replace the old one, which was destroyed by a landslide.

SISKIYOU COUNTY.

Bennett Bros., who bought a ledge from Campbell & Co., near the old Last Chance claim on Blue ridge, near Sawyers Bar, are developing it. At present they are sinking on the ledge.——The Orcott Bros. are running a tunnel on a pocket ledge on Graham gulch, near Yocumville, to tap it 40 feet down. About $15,000 has been taken out since last November.——G. W. Yocum & Son of New River, Trinity Co., have a ledge on Methodist creek, on South Fork of Salmon, which they are developing, and will put a mill on this summer.

The Dewey mine is 8 miles west of Gazelle. The outcrop of the ledge is over 75 feet wide. It is opened by tunnels, only development work so far being done. A 10-stamp mill has been built for sampling; and the Squaw Creek M. Co., who own the mine, are proposing to add thirty stamps, and possibly a cyanide plant.——Harris Bros. have located an 8-foot ledge near the Dewey.——Numerous other locations and discoveries have been made recently in this district.

STANISLAUS COUNTY.

E. L. Barkis of Oakdale has made contracts with land owners on the Stanislaus river, between Knight's Ferry and Oakdale, to dredge the river bed for gold. The consideration stated is 10% of the net receipts.

TRINITY COUNTY.

The Trinity Copper Co. has let a $10,000 contract for the construction of 5 miles of wagon road from Kennett to the Shasta King copper mine, for which a smelter is to be built. The road must be completed in five weeks.

TUOLUMNE COUNTY.

A. C. Morrison, Supt. Crystalline mine, near Jamestown, expects to have the mine going soon.

The High Point M. Co. of Des Moines, Iowa, have shut down the Manhattan mine, near Stent, and are taking out the machinery.

The old Porto Fino mine at Sonora, idle for many years, is being unwatered. The shaft is to be deepened and the ledge drifted on. A new gallows-frame is being erected and later hoisting works and a mill are projected. J. W. White is Supt.

The Preston Hill G. M. Co. has incorporated to mine near Jamestown. The directors are S. Silliman, Oakland; E. C. Dailey, T. K. Code, C. F. Humphrey, San Francisco; E. T. Hale, Jamestown.

In the Goldwin mine shaft, near Jamestown, at a depth of 435 feet a 7-foot vein with well defined walls was cut into and is of high-grade ore, carrying gold in paying quantities the entire width. A footwall streak about 13 inches wide is said to be exceptionally rich. The mill now being built is expected to be ready to run next week.

The Marshal M. Co. of San Francisco has bonded the Spring Gulch and Canyon mines and will push development work. The first payment of $4500 has been made. H. J. Sisty is Supt.

The old Solambo copper mine, near La Grange, is being unwatered preparatory to resumption of work. In the sixties the mine was operated by a French company, and considerable ore was shipped to Swansea, Wales. The mine is now owned by C. E. Hensley, who is reopening it.

The Olsen mine at Golden City has been bought at sheriff's sale for $10,000 by H. Willey of Santa Cruz. The mine was operated in early days and produced largely in gold and silver, but it is now thought to be more valuable for copper, for which it will be worked.

The Anderson mine, near Algerine, is being reopened by T. F. Woodside, the owner. This property is situated on the central belt of the mother lode.

The Continental mine, at Columbia, has resumed operations under the superintendency of A. S. Graham.

A strike is reported at the Nonpariel at Big Oak Flat. A quartz ledge was cut in the lower level west from the main shaft. This is the first quartz vein that has been encountered in this mine, the pay ore thus far having been all in slate. At present they are hoisting with a whim, and using a small boiler and engine are used for pumping. It is the intention to sink a new shaft, build a hoist and possibly a mill this season.

YUBA COUNTY.

At Brownsville the Clark mine tunnel is being cleaned out and retimbered, preparatory to reopening.

COLORADO.

BOULDER COUNTY.

The strike in the Gladys at Wall Street is widening with depth. The mine is owned by C. W. Caryl, but is bonded to Mrs. S. J. Cook.——The Elkhorn Co. says it has cut a vein of $20 ore in its tunnel. Machinery has been put on and other improvements will be made.

A strike is reported from the Slide Spur mine, at Gold Hill, owned by W. Teller of Denver, but bonded to Andrew & Wilson. The ore was opened in 700-foot level, is 18 inches wide and shows free gold and sylvanite. Shipments made daily return $200 a ton. The lessees have netted in two weeks $2700 over expenses and a royalty of one-third.

CHAFFEE COUNTY.

It is reported that the Hershberger tunnel, Cameron district, has opened one of the largest bodies of ore ever found in the Turret and Cameron districts. It is now 250 feet into Cameron mountain, and 150 feet from the surface.

The strike of copper ore at Howard, which B. T. Brooks claims as one of the best copper prospects ever found in that section, shows up well. The vein is from 2 to 4 feet thick on a quartzite and gneiss contact and shows great masses of extremely high-grade ore.

EAGLE COUNTY.

The Red Gorge M. & M. Co., S. B. Swink of San Antonio, Texas, president, owns seven claims at Red Cliff. This company propose to erect a mill at once.

GUNNISON COUNTY.

The company represented by W. Graflin has bought the Iron Cap mine in the Willow Creek district for $25,000. A shaft is down about 130 feet.

H. Miller, D. E. Turner, J. C. Lewis and G. N. Wheeler, of Denver, have incorporated the Sulphide Copper Co., capital $1,250,000, to mine the Lucky Star, Hard Cash and Occidental lodes in the Rock Creek district.

A find is reported from Taylor Park, where a vein of graphite 20 feet wide has been discovered. Samples have been sent to users and tested with satisfactory results.

GILPIN COUNTY.

McFarlane & Co. have commenced the erection at Nevadaville of the new rapid-drop stamp mill building of the Avon G. M. & M. Co.

S. Hoskin, manager of the Colorado-Carr M. & M. Co., has bought for his company the Eagle, Golden Eagle and Double Eagle lodes, Lake district, the price paid being $50,000 cash. They are so situated as to be worked through the main shaft of the Carr by crosscuts from the vein. The company is composed of Antwerp, Belgium, and London, England, investors. They are now preparing to construct an aerial tramway 6200 feet from the Carr mine to the Randolph stamp mill.

A meeting of Eastern capitalists largely interested in mining in Gilpin and Clear Creek counties is reported to have been held in Denver, at which it was decided that the solution of many problems in connection with the marketing of their ores is the erection of an independent smelter near Denver. The cost of this smelting plant will be about $350,000, and the construction is to be commenced in four months. It is said that a number of the leading miners of the two counties interested are to take an interest in the project.

A company with a capital of $100,000 has been organized in New Orleans by J. P. Adams and others, to operate the Defiance mine, in Russell gulch; W. S. Robertson will be Supt.

JEFFERSON COUNTY.

The Carpenter smelter at Golden is under cover and it is expected that the plant will be ready to blow in about June 15. It will have a daily capacity of 300 tons.

LAKE COUNTY.

A suit has been brought in the U. S. Court by the Fortune G. M. Co., Leadville, against the Resurrection G. M. Co., E. Smith and C. T. Carnahan, claiming $100,000 for ore extracted from the Fortune ground by the defendants and $50,000 damages. The trespass and extraction of $100,000 worth of ore complained of is said to have occurred in 1898 or 1899, but was not discovered until the Fortune workings were extended to where the alleged extraction of ore occurred.

OURAY COUNTY.

The Altoona M. Co. proposes to develop the Altoona group, near Ouray. Machinery will be put up soon.——The Camp Bird extension will commence work on the Ironton side as soon as the transportation of supplies is practicable.

PITKIN COUNTY.

Judge J. W. Johnson of Denver has bought for a Denver syndicate the Ophir and Queen Con. mining properties at Aspen.

CLEAR CREEK COUNTY.

The Marshall and Russell G. M., M. & T. Co. has been incorporated, capital $5,000,000, to mine at Empire, where it owns a large number of claims. The principal people interested are D. A. Russell, O. Merryhew, F. C. Russel, R. Corbin, C. Corbin, W. G. Davis, T. H. Davis of Pomeroy, and C. Crary of Huntington, West Virginia. Operations are to be commenced at once. A mill and a power plant are to be built, and the claims are to be developed by a tunnel.

The Waldorf M. M. & T. Co. has bought for $125,000 in cash the Stephens group in the Argentine district, comprising 28 patented claims and six millsites, comprising in all about 110 acres, with a record of production of $2,000,000 in gold, silver and lead.

F. L. Branham, W. Ennis and J. Campbell have leased the big dump of the Kirtley mine at Georgetown, which will be shipped to the smelters. There are over 2,000 tons that will run from 30 to 50 ounces silver per ton in gray copper, which cannot be successfully concentrated. It is thought that the entire dump can be smelted at a profit, for when first opened it took 100-ounce ore to pay.

The Sun & Moon Co. at Idaho Springs have elected J. W. Britton of Cleveland president; G. G. Snowden of Cleveland secretary and treasurer. Manager Sims has been authorized to buy new machinery,

and will put in an air compressor 16x16 in size at once.

SAN JUAN COUNTY.

Edsall, Key & Co. are said to be the buyers of the Silver Queen mine at Silverton for $100,000. They have taken possession and propose to develop it by installing $65,000 worth of new machinery. The present stamp mill of twenty-five tons capacity is to be quadrupled, a tramway built from the mine to the mill, with flumes, reservoirs and wagon roads.

SAN MIGUEL COUNTY.

A statement accompanied by the figures from the books of the company by A. L. Collins, manager of the Smuggler-Union mine at Telluride, shows that in the month of April 146 men, working 3405 shifts, received on contracts in the mine $10,790.05, an average of $4.06 a shift. Two men received $8.23 a shift, the highest, and two men $1.53 a shift, the lowest. On only 477¼ shifts was the sum earned less than $3 a shift—that is to say, over 86% of the total number of shifts worked earned over $3.

The strike on the Smuggler-Union mine at Telluride will probably result in suspension of operations for about three months. The company will remodel the old mill and make some changes in the new plant. The machinery has all been taken out of the old mill and will be replaced by 120 stamps, with a capacity of about 400 tons per day. When the company starts up again it will be with an increased force.

TELLER COUNTY.

It is reported that Chas. Butters has worked out the treatment scheme for the profitable handling of low-grade Cripple Creek ores. It is understood also that the directors of Stratton's Independence have arranged to erect a mill at the mine to treat the dump, which will run on an average above $8 per ton, as against $3 cost of the treatment. The average dump of the Cripple Creek mines will contain from 25,000 to 100,000 tons of low-grade stuff. Mr. Butters is understood to have made propositions to several of the big mines to handle the dumps.

The Solitaire Leasing Co., operating the Columbia at Cripple Creek, has struck a vein 360 feet from the surface, which, at first 1 inch, is now 10 inches wide and carries values up to thirty-six ounces gold per ton.

IDAHO.

BLAINE COUNTY.

W. Darlington has bonded the copper claims and improvements in Big Copper basin, 42 miles from Hailey, from N. J. Sharp of Hailey and his associates. A smelter was built on the property a year ago by Portland parties, who shut down unable to make the ores pay.

IDAHO COUNTY.

E. B. Simmons, of Dixie, says the main shaft of the Ajax mine is down 330 feet, and the 20-stamp mill will be installed as soon as the roads will permit of hauling the machinery.

F. Brown, of Mount Idaho, has bought a 2-stamp mill and concentrating plant for the Jumbo mine at Buffalo Hump. It is expected the mill will be running early in June.

SHOSHONE COUNTY.

The August and Sunset claims have been bonded to Butte parties by E. E. Horst of Kingston and E. L. Powell of Spokane. It is understood development will be pushed.

It is reported that all the silver and lead mines in the Cœur d'Alene country are to be consolidated and operated under a single management. It is expected by the consolidation to make the regulation of the price of lead an easier task.

MONTANA.

BEAVERHEAD COUNTY.

A new air compressor and 1000 feet of piping have been taken up to the Polaris mine, in the Lost Cloud district. It is reported that J. E. Rickards and J. MacGinniss of Butte have secured another lease on the Polaris.

A. Manser, Supt. of the Montana C. & G. Co. of Chicago, developing the Manser mines, near Dillon, states that he has a few men grading site for a new hoisting plant, which will be installed, with a capacity for sinking to a depth of 1000 feet.

FERGUS COUNTY.

Henry Wick of New York, a director in the American Steel Co., has joined Finch & Campbell of Spokane in the purchase of the Kendall mines, near Maiden. They have made the first payment of $100,000 and have taken possession. H. T. Kendall has retained a one-tenth interest. The new owners will enlarge the mill and construct the ditch to bring water from Warm Spring creek. R. T. Neill, agent, will let the contracts for the ditch and superintend the commencement of other projected improvements.

Lewistown, May 8.

It is reported that the Burke & Sweeney sapphire mines, near Lewistown, have been bonded at $50,000, and that extensive improvements will be made at once. The syndicate consists of C. D. McClure and P. A. Fusz, who are interested in the Granite Mountain property at Phillipsburg, and D. Jankower of New York. They have incorporated the American Gem Mining Syndicate.

During April the mill of the Great Northern M. & D. Co. at Gilt Edge crushed 4100 tons of ore, producing $33,000 in bullion. The average return was $8 per ton.

The first bullion shipment for May from the Central Montana Mines Co., Whiskey gulch, was nearly $5000—the output of the mill for twelve days' run.

FLATHEAD COUNTY.

It is reported that Sanford & Grubb of Kalispell, owners of the Blacktail group, West Fisher, will build a mill on their property this summer.

MADISON COUNTY.

It is reported that N. and H. C. Ptomev will build a five-stamp mill on the Lucas mine at Summit.

MISSOULA COUNTY.

The Western Montana Cyanide M. Co. of Butte has taken an $8,000 bond on the Dickson placer patent in Nine-Mile creek.

NEVADA.

ELKO COUNTY.

Supt. A. H. Smith of the Murphy-Curieux mine, at Bull Run, says that the mine will be reopened soon, employing from fifteen to twenty men.

ESMERALDA COUNTY.

The Tonapah mines are changing and improving with depth. The values are changing from a large silver value to a large gold value. Some adjoining claims are proving excellent and are being worked by leasers.

WASHOE COUNTY.

It is reported that nothing but shipping ore is coming out of the Bell and Wedekind mines, Reno, being over $2000 a day, which will be increased when openings are extended far enough to permit of bigger shifts being worked.

NEW MEXICO.

TAOS COUNTY.

A sale of five mining claims near Tres Piedras for $5000 has been made to Detroit parties.

J. P. Rinker has sold the Mineral Point claim at Hopewell for $1750 to R. C. Moody of Cleveland, Ohio. A corporation will work it.

It is said $20,000 will be expended developing the Elliott group in Cow Creek, lately bought by Pittsburg people.

The Unity C. & G. Co. of Boston, Mass., have bought six claims on Spring creek and are preparing to work them on a large scale. Mr. Driscoll is manager.

The New Mexico C. & G. Co. of Milwaukee, Wis., owners of the Strawberry claim, have put in a compressor and pump.

SOCORRO COUNTY.

The Bell-Hanna mine at Rosedale has been sold to Eastern people, who intend to erect a stamp mill. L. M. Lasley is Supt.

OREGON.

BAKER COUNTY.

Tests of ore from the Concord mine at Baker City are to be made in the stamp mill of the May Queen preliminary to construction of a mill on the Concord.

GRANT COUNTY.

The Scandia M. & M. Co., of Granite, is preparing to explore all the underground ledges of Quebec hill. At a stockholders' meeting, recently held in Spokane, it was decided to put in power drills. The tunnel is 7 feet clear between timbers and is made for a double track.

A nugget is reported to have been taken from the placer mine owned by R. Cannon of Spanish gulch and W. H. Johnson & Son of John Day, in the Spanish Gulch mineral belt. The nugget weighed about twenty-five pounds, contained considerable quartz and was valued at $2500.

UTAH.

BEAVER COUNTY.

The Royal M. Co. now owns and operates the old Cactus mine, near Frisco. Development proceeds from a 200-foot shaft.

The old Carbonate and Rattler group, in former days among the most prominent propositions at Frisco, have been sold to M. P. Gilbert and associates of Salt Lake City for $100,000, payable in eighteen months. For 400 feet of sinking upon new shaft a contract has been let. The old bullion record shows a production of $800,000 in silver-lead ores.

GRAND COUNTY.

The National Copper Co., having six claims in the La Sal mountains, is developing. The incorporators are J. E. Smith, C. E. Peyton and others of Salt Lake City. Work has uncovered copper ore in the form of chalcopyrite and bornite in a lime and porphyry formation.

IRON COUNTY.

The contract for the $80,000 mill of the Ophir M. Co, at Stateline, has been awarded to Dederichs & Burke of Salt Lake City. The contract provides for completion early in September.

JUAB COUNTY.

The Lower Mammoth Extension M. Co. has incorporated, capital $75,000, to operate the Anita, Anita Fraction and Anita Fraction No. 1 mining claims, at Tintic. J. Chipman is president and M. W. Taylor vice-president of the company.

The Cyclone M. Co. has incorporated to mine the Cyclone and Tip Top claims, at Stockton. The Tip Top has been opened by a shaft, exposing a high grade of silver-lead ore. The Cyclone claim has been opened up by an incline.

KANE COUNTY.

It is reported that big finds of copper ore are being made along the Colorado river. The new district reaches as far north as Kane county and extends as far south as Mohave, in Arizona.

PIUTE COUNTY.

The Annie Laurie, located 16 miles from Sevier station, on Gold mountain, at an altitude of about 9000 feet, is developed through tunnels and produces a gold ore that is well suited to cyanide work. The mill has a capacity of 150 tons per day. A refining plant is to be put in to reduce the auro-cyanides to bullion. The values extracted amount to about $10 per ton. A water wheel is being put in to operate an electric generator. A compressor plant is also being added. Walter G. Filer is the manager.

SUMMIT COUNTC.

The St. Louis Ontario M. Co. has incorporated, capital $50,000, to mine the Dewet Nos. 1, 2 and 3 and the Kruger Nos. 1, 2 and 3 mining claims at Park City. Work is to begin at once. G. H. Lippelt is president and H. C. Brownlee secretary.

The Silver Star M. & M. Co. has incorporated, capital $100,000, to mine the Amphion, California and Panneka mining claims in Park City. M. S. Hammer is president, T. L. Hammer secretary and treasurer.

TOOELE COUNTY.

The Sacramento M. Co., Mercur, during 1900 mined and milled 42,537 tons of ore, which yielded $115,789.96 gold. During the year $22,394.49 was expended on improvements and $75,487.14 on operation, the cash balance for the year being $25,479.10. The report shows the cost of mining and milling with an expense item for experiments with the new roaster had been confined to $1.77 a ton, this to be further reduced. Glen R. Bothwell of Salt Lake City was elected president; Robert E. McConnaughy, secretary and treasurer.

The clean-up at the Con. Mercur's big mill at Mercur for month of April is $160,000.

G. C. Moore, manager of the syndicate owning the Sunshine mine and mill at Sunshine, Camp Floyd district, has begun work underground on the mine and in the autumn expects to start the mill, which will meanwhile be added to with additional tanks and a roaster to treat the arsenical ores.

The Sunshine M. Co. will start up its mine and mill at Sunshine, in charge of G. A. Moore.

UTAH COUNTY.

The Chicago-Utah Onyx Co., G. R. Potter, manager, Salt Lake City, are quarrying onyx at a point 14 miles west of Lehi. The onyx is gotten out in cubical blocks. It will be conveyed by tram line down to the edge of Utah lake, thence in barges across the lake to the railroad.

WASHINGTON COUNTY.

G. Snyder, superintendent of the Dixie, near St. George, reports ore carrying from 25% to 30% copper now going to the smelter, from which 100 tons of copper bullion is produced monthly.

WASHINGTON.

FERRY COUNTY.

Returns from a shipment of nineteen tons of ore from the Morning Glory mine, Republic, were $140 a ton.——The Quilp compressor plant is running and fifty tons of ore will be sent daily to the Republic mill.

A placer strike on Granite creek, 2 miles west of Republic, has been made and hundreds of men and many women have staked the creek for a distance of 12 miles from its mouth. Work on the diggings where gold was found resulted in finding $75 worth of shot gold the first day. One nugget valued at $8 is exhibited. Prospectors are panning gravel all along the creek, and in most cases are getting colors. The gold seems to carry some silver and is worth about $15 an ounce. Bedrock is 15 feet below the surface.

A strike of gold-silver ore is reported from the new camp at Meteor, on the south half of Colville reservation, about 90 miles northwest of Spokane.

LINCOLN COUNTY.

Capt. J. Gray, Supt. of the Crystal, says that on the 300-foot level there has been cut a 7-foot vein.

SKAMANIA COUNTY.

A. Olsen, foreman at the Cascades Calumet mines, in the St. Helens district, says the Norway mine dump has hundreds of tons of ore piled up ready for shipment to Castle Rock as soon as the wagon road is completed. He has taken contracts for continued work upon the Norway and for a tunnel for the Swedish M. Co. upon the Upper Sweden and a shaft upon the Lower Sweden claim.

WYOMING.

ALBANY COUNTY.

It is said that the owners of the Rambler copper mine, near Laramie, decided to abandon the property, when the mine foreman said he would put in just one more shot for luck. This shot is said to have opened up one of the largest and richest veins of copper ore ever discovered in the Rocky mountains.

FOREIGN.

BRITISH COLUMBIA.

The Triune mine at Ferguson is to be started up, and an aerial tramway installed to enable working the mine the entire year.

It is reported that 6 feet of high-grade ore has been struck in the 400-foot level in the west end of the Cariboo at Camp McKinney.

The pay shoot of the Wonderful, Slocan, has been found in the tunnel where it had been opened under some former management, but for some reason abandoned, the drift being filled with waste. W. W. Warner, who leased the mine, cleaned out the drifts and found a 2-foot vein, assaying 115 ounces in silver and 70% lead.

W. H. Jeffery, M. E., who has an option on the stock of the Kaslo Smelter, Ltd., has interested capital to erect plant, build railway spurs, wharves and docks, tramways and other necessities for the running of a large smelter at Kaslo. Actual construction, it is said, would commence by the first of July.

W. A. Dier of Victoria has bought the Copper Canyon group at Mount Sicker, Vancouver island, including the Victoria, Susan and Copper Canyon claims, also the Amoka group—the May and Star—and the Yankee, adjoining the Tyee, for, it is said, $336,000. An equipment of machinery will be put on this summer.

The lower or No. 4 tunnel on the I X L, Rossland, at 220 feet has cut the shoot of ore found first in the No. 3½ tunnel. R. Clarke is manager.

The Winnipeg mine in Wellington is drifting in ore on the 400-foot level. The vein on this level is 12 feet in width.

J. W. Bryden has been exploring the properties of the Green Mountain M. Co. at Rossland with a diamond drill, and has located a number of very large ledges, some of which carry pay ore.

J. W. Bryden, M. E., has gone 100 miles up the Skeena river to operate sulphur deposits which have been partially developed and are said to be extensive and valuable. They are the only deposits of the kind so far opened up in British Columbia.

DUTCH EAST INDIES.

Prospectors visiting the islands succeeded in discovering gold, copper and gem stones, but found it impossible to develop their finds, owing to the opposition of the jealous Dutchmen who owned the land. Lately a way of getting around this has been found. The prospector now arranges with a prominent Dutch capitalist to apply for concessions and open the mine, the former getting a paid-up interest and the management. A number of large mining operations are being carried on in this way with satisfactory results. The Government of the Netherlands is beginning to realize the value of development of the mineral resources of the Dutch East Indies, and Dutch subjects can now obtain concessions for mining over country embracing hundreds of square miles, at the merely nominal rental of 2 cents per acre per annum, for a period of ninety-six years, and a royalty on the value of the gross yield of 4% per annum. The East Indian mining regulations are intricate and unfair, and miners desire a new, up-to-date mining law. Another trouble miners in the Dutch Indies experience is caused by officialism and red tape. Passports, concessionaire decrees and petitions have to be produced continually. To ob-

tain a mining concession a miner must possess unlimited Dutch patience and be prepared to pay. But, notwithstanding, mining is progressing in the Indies. In Celebes an Amsterdam company is working a valuable gold mine at Penogo. It contains three ledges from 8 to 15 feet wide. They have been opened by tunnels to a depth of 600 feet and assay about an ounce of gold per ton. At present the ore is free-milling; the gold is pure and is worth £4 per ounce. Native miners are employed at a weekly wage of 4 shillings. At Bone, about 15 miles from the bank of the Gorontalo river, a large copper mine is being worked. The lode is of great length and measures nearly 200 feet in width. It is being worked as a quarry. The average ore is estimated as containing between 3½% and 6% copper and a little gold and silver.

MEXICO.

President Greene says that 300-ton smelters would be added to the Greene Con. plant, in La Cananea, until a total capacity of 5000 tons daily was reached. There are now 1500 people in the camp, and the number is expected to increase to 5000 by the end of the year.

Personal.

E. C. VOORHIES of Sutter Creek, Cal., is in San Francisco.

CHARLES WOLF, Supt. Gold Hill mine, Calaveras county, Cal., has resigned.

J. D. STEWART of Gold Run, Cal., has been appointed Supt. of a Calaveras, Cal., drift mine.

GEORGE H. WYMAN has resigned as superintendent of the Checkmate mine at Pearl, Idaho.

VICTOR M. CLEMENT returned to Salt Lake City, Utah, from Parral, Mexico, on the 10th inst.

MAJOR R. G. EDWARDS LECKIE has resigned as manager Republic M. Co., Republic, Wash.

J. E. KERRICK of Salt Lake City, Utah, is at Baker City, Oregon, inspecting mines for Chicago people.

PROF. E. C. ENGLEHART, chemist and metallurgical engineer of Denver, Colo., is in Los Angeles, Cal.

H. DEC. RICHARDS, manager of Orleans Bar G. M. Co., at Orleans Bar, Humboldt Co., Cal., is in San Francisco.

H. L. JOHNSON, Supt. Oriental mine at Alleghany, Cal., has returned there from a business trip to Denver, Colo.

A. A. BLOW, consulting engineer Sheba G. M. Co. of South Africa, is in Denver—his former home—on mining business.

C. S. BATTERMAN, Supt. Butte & Boston mines, Butte, Mont., is inspecting the Bluestone mine, near Winnemucca, Nev.

JOHN A. KING, superintendent of the Verde Queen C. Co., at Jerome, Arizona, is in Denver, Colo., on a short business trip.

E. H. WILSON, late of California, has been appointed manager of the Kokomo-Pioneer M. & M. Co., at Idaho Springs, Colo.

J. W. DUNLAP, Supt. Devil's Basin Con. G. M., at Deadwood, Placer county, Cal., was in San Francisco during the past week.

ADOLPH MULLER, formerly of Nevada City, Cal., is now Asst. manager Adjah Bippo M. Co., in the Ashanti country, Africa.

B. L. JONES of Boston, Mass., is located at Jerome, Arizona, as assistant to E. A. Powers, superintendent of the United Verde Ex. Co.

MARK B. KERR has returned to Grass Valley, Cal., from San Francisco. He is a candidate for the office of Debris Commissioner of California.

W. S. GRAHAM, civil engineer and county surveyor of Placer county, Cal., is a candidate for the office of Debris Commissioner of California.

ARTHUR HOWLAND, late Supt. Davis Hydraulic mine, at Jump-off-Joe, Or., is going to Sumatra to examine prospects there for an Eastern syndicate.

DR. DAVID T. DAY of the U. S. Geological Survey, who is Supt. of the Mines Building at the Buffalo Exposition, had his building ready on the opening day—a distinction shared only by the exhibit of the U. S. Fish Commission.

Books Received.

The Fergus County Argus, published at Lewistown, Mont., has issued a pictorial edition, descriptive of the county, its resources, industries and people. It is pictorially and typographically an exceedingly fine exhibit of newspaper enterprise.

"Induction Coils," by H. S. Norrie, published by Spon & Chamberlain, 12 Cortlandt street, New York, 270 pages, 12 mo., is the second edition of this work, which has been revised and, with added new matter, has been brought down to an expression of the latest American practice. Gas engines and spark coils, new method in X-ray working and the latest on wireless telegraphy, are clearly and exhaustively discussed. The book is an excellent text and reference book on the electrical subjects it treats of and should be in the library of electrical students and practical workers in the art. Price, cloth, $1.

Commercial Paragraphs.

FAIRBANKS, MORSE & CO. have established a branch house in Salt Lake City, Utah, with C. P. Mason as local manager.

THE office and business of the Wright Manufacturing Co., manufacturers of high-grade steam specialties, Cleveland, Ohio, have been removed to Detroit, Mich., where the business of the company will hereafter be transacted.

VICKERS' SONS & MAXIM, the largest manufacturers in the world of war material, who have immense works in England, and who supply all foreign Governments, have recently equipped their plant with Cross oil filters manufactured by The Burt Mfg. Co. of Akron, Ohio.

Recently Declared Mining Dividends.

	Payable.
Pointer G. M. Co., Colo., 1 cent per share, $2,500	June 1
Portia G. M. Co., Colo., quarterly, 1 cent per share, $12,500	June 1
Ingham G. M. Co., Colo., monthly, ½ cent per share, $3,400	May 28
Doctor-Jack Pot Q. M. Co., Colo., monthly, 1 cent per share, $29,000	May 28
Modoc G. M. & M. Co., Colo., monthly, 1 cent per share, $5,000	May 15
Sacramento M. Co, Utah, $5,000	June 1

Latest Market Reports.

SAN FRANCISCO, May 16, 1901.

SILVER—Per oz., Troy: London, 27⅝d (standard ounce, 925 fine); New York, bar silver, 59½c (1000 fine); San Francisco, 59¼c; Mexican dollars, 50¼c San Francisco, 48½c New York.

COPPER.—New York: Lake, 1 to 3 casks, $17.25; carload lots, $17.00; Electrolytic, 1 to 3 casks, $16.75; carload lots, $16.62½; Casting, 1 to 3 casks, $16.60; carload lots, 16.50. San Francisco: 18. Mill copper plates, 20c; bars, 22@23c. London: £69 4s 6d per ton.

LEAD.—New York, $4.37½; Salt Lake City, $4.00; St. Louis, $4.32½; San Francisco $4.90, carload lots; 5¼c 1000 to 4000 lbs.; pipe 6, sheet 6½, bar 5½c; pig, $5.25. London, £12 7s per ton=2.77½ cents per lb.

SPELTER. — New York, $4.20; St. Louis, $3.75; London, £16 2s 6d per ton =3.58½ cts. per lb; San Francisco, ton lots, 5¼c; 100-lb lots, 6c.

ANTIMONY.—New York, Cookson's, 10c; Hallett's, 9c; San Francisco, 1000-lb. lots, 10c; 300 to 500 lbs., 11c; 100-lb. lots, 13@15c.

IRON.—Pittsburg, Bessemer pig, $17.25; gray forge, $16.50; San Francisco, bar, per lb., 2.65c in small quantities.

STEEL.—Bessemer billets, Pittsburg, $24; open hearth billets, $27.00; San Francisco, bar, 7c to 12c per lb.

TIN.—New York, pig, $26.00; San Francisco, ton lots, 28c; 1000 lbs., 28½c; 500 lbs., 28½c; less, 29c; bar tin, ℔ lb, 32½c.

QUICKSILVER. — New York, $51.00 large lots; London, £9 2s 6d; San Francisco, local, $47.00 ℔ flask of 76½ lbs.; Export, $45.00

MAGNESIUM.—New York, $2.90 ℔ lb.; San Francisco, $3.75.

ZINC.—San Francisco, 5¼c; slab, 5¾c; bar, 7c; zinc dust, N. Y., 8c.

BABBITT METAL.— San Francisco, No. 1, 10c.

SOLDER. — Half-and-half, 100-lb. lots, 18c; San Francisco, Plumbers', 100-lb. lots, 15c.

PHOSPHORUS. — F. o. b. New York 50@60c ℔ lb.

ASSAY LITHARGE.—San Francisco, 10c ℔ lb, small lots.

BISMUTH.—New York, ℔ lb., $2.25

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50-lb lots; San Francisco, $2.50 to $2.75 lb lots.

FERRO-MANGANESE. — Pittsburg, 80%, domestic, $62.50, large lots.

TUNGSTEN.—New York, ℔ lb., 95c; San Francisco, $1.15.

FERRO-TUNGSTEN. — New York, 37%, 32c; San Francisco, 65c (60%).

NICKEL.—New York, 50@60c ℔ lb.

PLATINUM.—San Francisco, crude, $22 ℔ oz.; New York, $22 per Troy oz

ALUMINUM.—New York, No. 1, 99% pure ingots, 35c; No. 2, 90%, 30c to 35c.

POWDER.—F. o. b. San Francisco: No. 1. 70% nitro-glycerine, per lb., in carload lots, 15½c; less than one ton, 17½c. No. 1*, 60%, carload lots, 13½c; less than one ton, 15½c. No. 1** 50%, carload lots, 11½c; less than one ton, 13½c. No. 2, 40%, carload lots, 10c; less than one ton, 12c. No. 2* 35%, carload lots, 9½c; less than one ton, 11½c. No. 2** 30% carload lots, 9c; less than one ton, 11c. Black blasting powder in carload lots, minimum car 728 kegs, $1.50 per keg; less car lots, $2 per keg.

CAPS.—3x, $5.50 per 1000; 4x, $6.50; 5x, $8; Lion, $9, in lots not less than 1000.

FUSE.—Triple tape, $3.60 per 1000 feet; double tape, $3.00; single tape, $2.65; Hemp, $2.10; Cement No. 2, $3.00; Cement No. 1, $2.65, in lots of 3000 feet and up.

CANDLES.—Granite 6s, 16 oz., 40s., 10½c ℔ set; 14 oz., 40s., 9½c.

CHEMICALS.—Cyanide of potassium, 98%–99%, jobbing, 32½@33½c ℔ lb.; carloads, 30@31c; in 10-lb. tins, 40c; sulphuric acid, in carboys, 66% B, 2c ℔ lb.; soda ash, $1.90 ℔ 100 lbs. 58%; hyposulphite of soda, 2¾@3c ℔ lb.; blue vitriol, 5¾@6½c ℔ lb.; borax, concentrated, 7@8c ℔ lb.; chlorate of potash, 12@13c; roll sulphur, 6c; alum, $1.90@2.00; flour sulphur, French, 2½@2½c; California refined, 1¾@2c; nitric acid, in carboys, 8c ℔ lb.; caustic soda, in drums, 3@4c ℔ lb.; Cal. s. soda, bbls., $1.00; sks, 95c ℔ 100 lbs.; chloride of lime, spot, $2.50@2.60; nitrate of potash, in kegs, 8c: caustic potash, 10c in 40-lb. tins.

New Patents.

DEWEY, STRONG & CO.'S SCIENTIFIC PRESS PATENT AGENCY, 330 Market St., S. F., has official reports of the following U. S. patents issued to Pacific coast inventors:

FOR THE WEEK ENDING MAY 7, 1901.

673,591.—COIN CALCULATOR—G. A. Aldrich, S. F.
673,671.—SEPARATOR—J. Anderson, Walla Walla, Wash.
673 752.—MIRROR SUPPORT—Bader & Cartwright, S. F.
673,376.—ELECTRIC SIGNAL—H. R. Bennett, S F.
673,390.—VEHICLE WHEEL—J. P. Erie, Los Angeles, Cal.
673,768.—CRUSHING ROLL—C. R. Fleming, Black Warrior, Ariz.
673,555.—PRINTING PRESS GRIPPER—V. A. Hancock, S. F.
673,851.—BUTTON SEWING MACHINE—F. T. Leilich, S. F.
673,563 —ELECTRIC LAMPS—G. B Miller, S. F.
673,447 —CURTAIN ROD BRACKET — E. M. Nold, Pasadena, Cal.
673,846.—DECOY DUCK — H. A. Ranert, Portland, Or.
673,737.—MORTISING MACHINE—W. J. Smith, Detroit, Or.
673,851.—BALL BEARING — Williams & Mitchell, Spokane, Wash.

ANNUAL MEETING.

The Regular Annual Meeting of the Stockholders of the National Cons. Mining Company will be held at the office of the company, 773 Mission St., San Francisco, California, on MONDAY, the 3d day of June, 1901, at the hour of 8 o'clock P. M., for the purpose of electing a Board of Directors to serve for the ensuing year, and the transaction of such other business as may come before the meeting.

GEO. W. FLEISNER, Secretary.
Office—773 Mission St., San Francisco, California.

Notice of Meeting of Stockholders.

In accordance with the by-laws of that company, the Regular Annual Meeting of the Stockholders of the JAMISON MINING COMPANY, for the purpose of electing Directors for the following year and transacting such other business as may properly come before it, will be held at the office of the company, rooms 54–59, No. 120 Sutter street, San Francisco, California, at 2 o'clock P. M on MONDAY, the 20th day of May, 1901.

SAM W. CHEYNEY, Secretary.

MOHICAN MINING AND MILLING COMPANY.—Location of principal place of business, San Francisco, California; location of works, Tuolumne County, California.

Notice is hereby given, that at a meeting of the Board of Directors, held on the 16th day of May, 1901, an assessment (No. 1) of ten (10) cents per share was levied upon the capital stock of the corporation, payable immediately in United States gold coin, to the secretary, at the office of the company, 300 California St., San Francisco, California.

Any stock upon which this assessment shall remain unpaid on the 15th day of July, 1901, will be delinquent, and advertised for sale at public auction; and unless payment is made before, will be sold on WEDNESDAY, the 14th day of August, 1901, to pay the delinquent assessment, together with the costs of advertising and expenses of sale.

By order of the Board of Directors.

JNO. W. CLASSEN, Secretary.
Office—300 California St., San Francisco, California.

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SITUATIONS WANTED.

After May 20, a young man (33) with college training and three years' experience as assayer, cyanider and assistant superintendent, successively, with prominent mining company, wishes a similar position, or would manage a small property at a reasonable salary. References. Address M. T., 880 Eddy St., San Francisco.

WANTED.—POSITION BY A YOUNG ENGINEER with good education and several years' experience in various branches of electrical work. Position in power transmission work preferred. Address "H. J.," care Mining and Scientific Press.

ASSAYER, BOOKKEEPER, TYPEWRITER and General Office Man desires a situation. Ten years' practical experience. Best references given. Address A. Sayer, care of Mining and Scientific Press office.

WANTED.

WANTED.—I have orders from Eastern capitalists for the following described properties: One large, well equipped gold mine with ore in sight, and improvements, to justify a value of from $1,000,000 to $5,000,000; also, one large copper mine of like size and value. All business strictly confidential. Apply to E. J. FRASER, No. 522 Parrott Building, San Francisco, California.

Wanted, A Young Draughtsman.

One experienced in smelter work preferred. Address ALFRED VON DER ROPP, Selby, Cal.

WANTED.

A Man Who Understands Building a Brick Reverberatory Furnace.

Party with some capital preferred. Have contract to build one at once. Must be practical and experienced. Address "B. L. R.," care Mining and Scientific Press.

Placer Deposits.

Parties interested in placer deposits that cannot be successfully operated, owing to a lack of water, should communicate with THOMAS A. EDISON, Orange, N. J.

WE BUY very rich Ores, Dental Scraps, Tellurium Ores, Mill Wastes, Jewelers' Sweeps, Gold Retorts, Old Iron Retorts, Base Amalgam, Quicksilver, Amalgamated Plates, Gold and Silver, Old Slags.

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Requires Only Limited Water Supply. An Ordinary Driven Well Will Furnish All the Water Needed.
Capacity 2 Tons to 200 Tons Per Hour.
A Machine That Has Stood the Test.

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Mr. A. Y. Gordon, Elkhorn, Colo., April 26, 1901: "Your 'Wonder' Placer machine is the greatest gold saver I have ever seen. It saves the finest Flour Gold. With an 18-inch machine one boy and myself will wash 2 tons of gravel per hour."

From Mr. T. R. Andrews, Matape, Sonora, Mexico, April 12: "It is the greatest machine of its kind in existence. It saves every atom of gold and its capacity is truly marvelous."

From the Johnson Assaying Co., San Francisco, April 13: "We have tested your machine thoroughly and are greatly pleased with it. It saves all the gold and is the best machine of its kind we have ever seen."

For descriptive catalogue, terms, etc., write to

The International Mining & Developing Co.,
Folwell Blk., CANTON, O.

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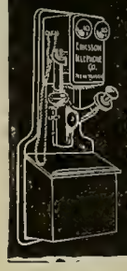

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Electric, Railway and Manufacturers' Supply Co.,

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RAILWAY SUPPLIES AND ELECTRICAL SPECIALTIES.
Pacific Coast Agents ERICSSON TELEPHONE COMPANY.
WE CARRY FULL LINE OF ABOVE GOODS.

FOR SALE.

FOR SALE.

The irons for a heavy pump bob, formerly used on 6-inch Jackhead pump, including cast bearing for elbow joint, with bolts and straps; cost $160; will be sold for $75 cash. Address IRA HILL REED, San Andreas, Cal.

FOR SALE.---1200 feet of 12-in. Steel Pipe, No. 14 gauge, in good condition.

Inquire PORT COSTA WATER CO., 326 California St., San Francisco, Cal.

Valuable Hydraulic Mining Property,

located in Plumas County, Cal., containing 273 acres, title U. S. patent, water rights, ditches, etc., FOR SALE AT A BARGAIN. Terms easy. For further particulars, apply to ALMARIN B. PAUL, 27 Crocker Building, San Francisco, Cal.

TO ASSAYERS.

A fine set of assay scales with pulp balance, and set of assay ton weights, all in good order, will be sold for $125. If applied for soon. The outfit consists of one Troemner's No. 5 balance with aluminum beam and agate bearings, mounted in glass case with sliding doors and plate glass bottom, original cost $175; also one Becker's pulp balance No. 18, with 8-inch beam, mounted in glass case with sliding doors, costing $26. Further particulars by addressing Box 4, San Andreas, Cal.

FOR SALE.

ONE COMPLETE PLACER MINING DREDGE

OF THE ELEVATOR TYPE.

With buckets having capacity of seven and a half cubic feet. Dredge only used few months. Located on Grasshopper creek, near Bannack, Mont. For full particulars, address THE BUCYRUS COMPANY, South Milwaukee, Wis.

FOR SALE.—The following high grade mines. All of the gold mines contain free-milling ore. They are all easily accessible by rail and good roads, and are amply supplied with water and timber. They are offered at owners' bedrock prices. They are all good bargains:
Gold mine (2 claims), 165 miles from S. F. $ 50,000.
Gold mine (5 claims), Plumas County, Cal. $ 75 000.
Gold mine (8 claims), 166 miles from S. F. $160,000.
Gold mine (3 claims), 175 miles from S. F. $250,000.
Copper mine (40 claims), Arizona. Very cheap
Full particulars given to parties desiring to purchase good properties. Any one or all of the above properties can be purchased from E. J. FRASER, 522 Parrott Building, San Francisco, California (sole agent for the owners).

SECOND-HAND MACHINERY.

PULLEYS, SHAFTING, BELTING, BOXES, BOILERS, ENGINES, HOISTERS, STAMP MILLS, RAILS, CABLE—all but little used.

THE S. S. MACHINERY CO.,

Sixth and Market Sts, DENVER, COLO.

SEND FOR DESCRIPTIVE CIRCULAR.

Special Meeting.

OXFORD BETA TUNNEL AND MINING Company.—There will be a special meeting of the stockholders of the Oxford Beta Tunnel & Mining Company, to be held at the office of the company, No. 135 Geary St., Room 111, San Francisco, at the hour of 4 o'clock P. M., on the 4th day of June, 1901, for the purpose of increasing the capital stock of the company from twenty-nine hundred shares of the value of one hundred dollars each to one hundred thousand shares of the value of two dollars and fifty cents each. By order of the Board of Trustees. W. H. KNIGHT, Secretary.

THE S. H. SUPPLY CO.,

THE MACHINERY DEPOT OF THE WEST,

22d and Larimer Streets, DENVER, COLO.

During the past three months we have dismantled three mills: the Royal Gorge Mill, Canon City; the Oneida Reduction Works, Victor, Colo., and the Gold Brick Mill at Gunnison, Colo. The first of these was in actual operation less than thirty days; the second, ninety days, and the third one year. In all of these mills amalgamating machinery was used, and the consequence is that we have a great assortment of this class of machinery. For use it is as good as new in every respect. We are offering this machinery at a saving of from 50% to 75% over the cost of new machinery. We have:

14 Standard Amalgamating Pans.
7 8-Foot Settlers.
4 Cleanup Pans.
8 Amalgam Safes.
15 Quick Elevators.
4 Amalgam Cars.
5 Quick Tanks.
3 Retorts and Bullion Furnaces.

Two of these mills were dry crushing, containing the following roasting and drying machinery:

Howell Improved White Roasting Furnace (60x27).
3 18-Foot Revolving Ore Dryers.
1 Bruckner Roasting Furnace.
1 40-Foot Pierce Roasting Furnace.

All of these plants were fully equipped with power, including Corliss engines (18x42); tubular boilers and Heine water tube boilers; feed water heaters, and pumps.

Thousands of feet of rubber and leather belting, shafting, pulleys and hangers are in our warerooms. Write for our prices.

The air compressors we have in stock and can make immediate shipment on, are:

12¼x14 Ingersoll-Sergeant.
16x14x10½ Norwalk.
12x14 Rand.
10x12 Knowles Belt Driven.
6x8 Knowles Belt Driven.

Our new catalogue is just issued and we will send you one if you ask for it. It contains a large amount of good information in regard to prices, as all of them are put in plain figures. No discounts. Send for it.

THE S. H. SUPPLY CO.,

22d and Larimer Streets,

DENVER, COLORADO.

120-Stamp Mill

At Hassel, Montana,

FOR SALE.

Will be Sold as Separate Items or Entire Mill.

Erected in 1897 by the Union Iron Works of San Francisco.
Only Partially Operated for a Few Months.
Guaranteed in Splendid Condition.

WILL NAME PRICES F. O. B. TOWNSEND, MONTANA, OR DELIVERED.

SPECIFICATIONS (Condensed).

2 NO. 5 McCULLY GYRATING CRUSHERS, with steel wearing parts.
26 ORE BIN GATES, 20″ x 24″, made of $\frac{5}{16}$″ steel plates, with racks, guides, boxes, pinions, shafts and hand wheels.
11 UNION CHALLENGE ORE FEEDERS, 11 right and 11 left.
11 10-STAMP BATTERIES. Stamps weighing 1000 lbs. each, arranged to be run in mortars of 5 stamps each, driven by belt and tighteners. Mortars especially arranged and designed for inside amalgamation, and weigh with apron 6500 lbs. each. (5 batteries never used.)
66 COPPER PLATES, 4′ x 5′, weighing 5 lbs. per square foot, plated with one ounce of silver per square foot.
6 OVERHEAD CRAWLS, complete with Norway Iron Hooks
2 4-WHEEL CRAWLS FOR CRUSHERS, with Norway Hooks.
420 LINEAL FEET ¾ x 1½ TRACK.
6 1-TON DIFFERENTIAL CHAIN BLOCKS.
2 3-TON BLOCKS FOR CRUSHERS.
47 UNION IMPROVED 4′ VANNER CONCENTRATORS, complete in every particular. (29 never used.)
2 AMALGAM CLEAN-UP BARRELS, 28 x 36.
1 AMALGAM CLEAN-UP BARREL, 20 x 30, complete with tight and loose pulleys.
3 4′ SWINGING BATTEAS and all fittings complete.
1 CAST IRON WASH TANK for clean-up work, 48 x 30 x 16.
1 HORIZONTAL 12″ GOLD RETORT with all iron work complete.
1 SET OF IRON WORK FOR BULLION MELTING FURNACE.
1 MAIN DRIVING PULLEY, 78 x 23½.
2 MAIN ROPE DRIVE WHEELS, 168″, grooved for five 1½″ ropes.
1 LOT, being all necessary shafting, hangers, pulleys, belting, etc., for mill.
1 LARGE LOT OF PIPING, all sizes.
1 RAND DRILL COMPANY'S COMPRESSOR, 16 x 22, Class D, duplex (never used).
1 RANKIN & FRITSCH 16 x 42 CORLISS ENGINE.
1 HORIZONTAL RETURN TUBULAR BOILER, 75 H. P.
1 3-PHASE ALTERNATING CURRENT GENERATOR, 500 K. W., 60 cycle with 24 poles, type A. P., volts full load 2400, A. M. P. 120, revolutions 300, with rheostat.
1 ELECTRIC GENERATOR OR EXCITER, 12½ K. W. Multipolar Direct Current Exciter, type M. P., class 4-12.5-12.75, volts 125, with rheostat.
1 MARBLE GENERATOR SWITCHBOARD PANEL, 30″ x 90″ x 2″, containing one general field rheostat, one exciter field rheostat, one station transformer, one potential indicator, one current indicator, one pilot lamp, one ground detector with plug and receptacle, 3 type L lightning arresters, 6 feeder fuse blocks, one double pole exciter switch, two single pole switch brake 2000-volt switches, iron angle frame.
3 3-PHASE INDUCTION MOTORS, type "I," class 12-150-600, form "A," H. P. 150, cycle 60, volts 2080.
2 3-PHASE INDUCTION MOTORS, type "I," class 8-30-900, form "A," H. P. 30, cycle 60, volts 220.
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100,000 FEET NO. 2 B. & S. COPPER WIRE.
1 LARGE LOT OF ELECTRICAL FIXTURES AND FITTINGS.
2 PELTON WATER WHEELS, 350 H. P. each.

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All Offers Subject to Previous Sale. **CHICAGO, ILL.**

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NORTH STAR STEEL BABY DRILL.

—— MANUFACTURERS OF ——

Rock Drills, Air Compressors, Mining Hoists, and Pumps for Compressed Air. Corliss Engines, Boilers, and Steam Appliances.

ALSO AGENTS FOR LAIDLAW-DUMM-GORDEN COMPRESSORS.

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For Chlorination, Refining and other processes. Also Muriatic and Nitric Acids, Blue Vitriol, Copperas Commercial and C. P. Our chemically pure Acids and Ammonia are guaranteed perfect.

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UNION IRON WORKS,

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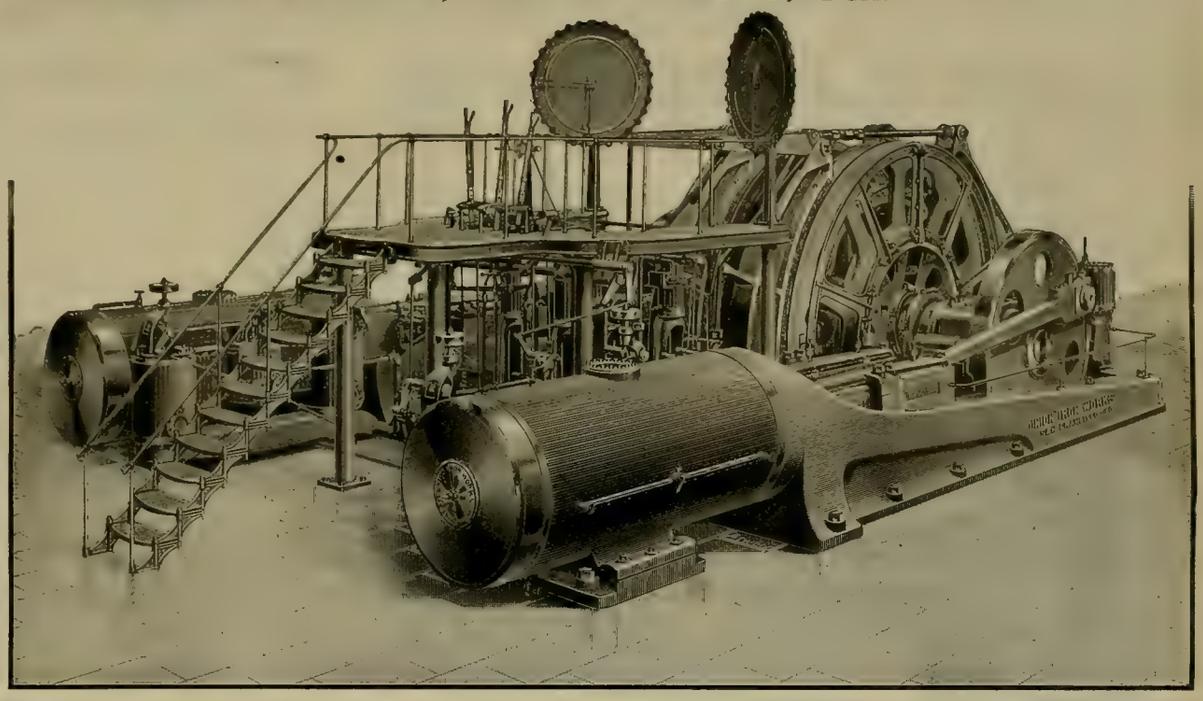
30in. x 72in. Direct Acting Hoisting Engine

BUILT FOR THE

Anaconda Copper Mining Company

OF MONTANA.

Embodying all that experience and practical working have demonstrated as valuable in this class of machinery.

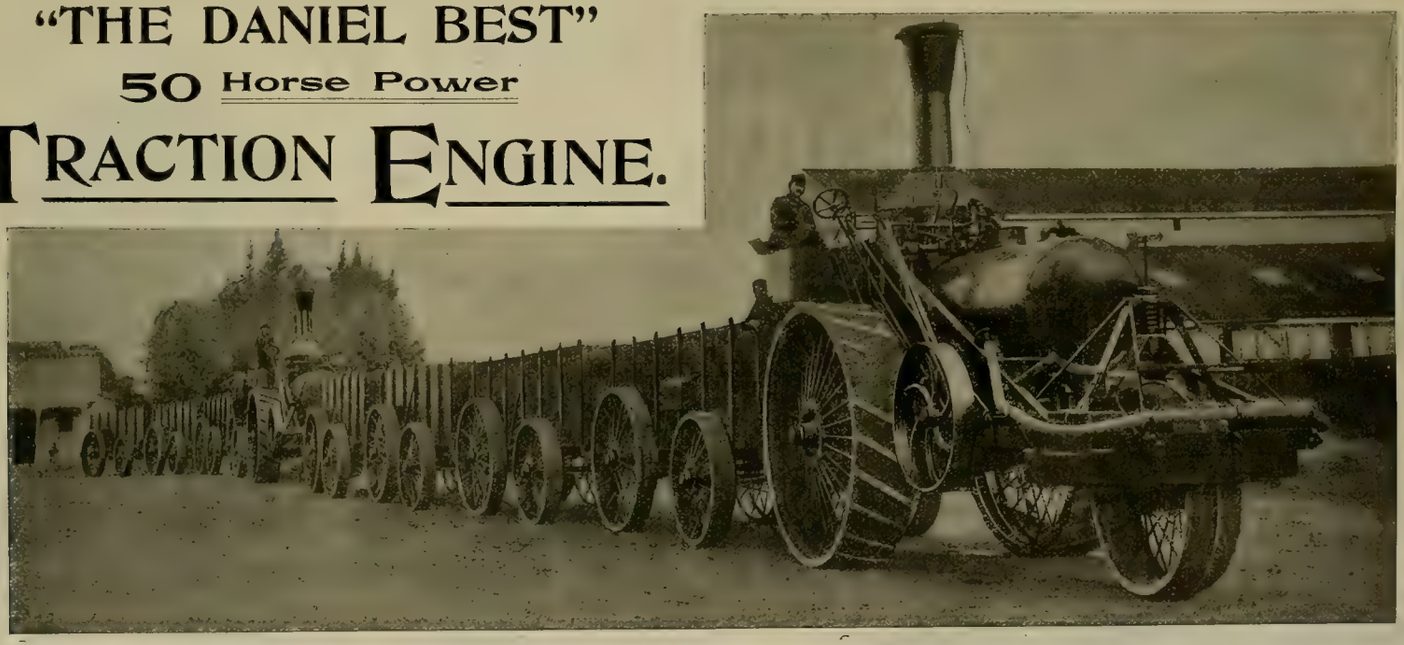


The brakes, clutches and reversing gear are arranged to be operated by compressed air or steam, by means of auxiliary cylinders which are under full control of the engineer, stationed upon the elevated platform shown, insuring the most rapid work with absolute safety. Shaft hollow forged steel of ample strength and stiffness to withstand any strains; reciprocating parts of steel and are as light as consistent with the duty required; cylinders of the "overhung" type, weight being taken by a guide saddle, which admits of free longitudinal movement, due to expansion, causing no strain on bed plate or foundations; cylinders steam-jacketed, fitted with valves provided with Corliss releasing gear and hand cut-off, enabling the engines to be run economically with reference to the work to be performed; bed plates modification of the Porter Allen type, heavy and substantial, with large foundation base and anchor bolts. A duplicate of this engine has also been furnished the Homestake Mining Company of Dakota.

"THE DANIEL BEST"

50 Horse Power

TRACTION ENGINE.



FREIGHT CARRYING CAPACITY OF WAGONS, 16 TONS EACH, OR A TOTAL CAPACITY OF TRAIN, 48 TONS.

Capacity of Engine, 50 HORSE POWER.

Over One Hundred of these Powerful Engines in use on this Coast in the principal Logging and Lumbering Camps and for general freighting purposes. EVERY ONE A SUCCESS AND MONEY MAKERS.

These outfits are particularly adapted to haul freight of any description from out-of-the-way places, and will reduce the cost of transportation at least one-half and in many instances two-thirds. They can generally be worked where animal teams now do the work, and haul their immense loads of from thirty to fifty tons, ascending and descending grades as much as 5 per cent to 30 per cent, depending upon condition of the road; loads may be increased to even greater amount on a firm and moderately level road.

Send for Descriptive Circulars and Price List. Wagons are built which are best suited for the kind of freight to be handled.

Estimates made for complete Steam Freighting Outfits. Address

THE BEST MANUFACTURING COMPANY,

San Leandro, California.

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SAN FRANCISCO, CALIFORNIA.

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Gold Dredging Machinery

And COMPLETE EQUIPMENT for Placer Mines OUR SPECIALTY.

—WE BUILD—

GOLD DREDGES Complete in Running Order

to handle 2500 cubic yards per day at a cost of 3 cents per cubic yard.

We excavate 50 feet below water, 20 feet above water and handle boulders up to one ton weight.

SEND FOR DREDGING CATALOGUE NO. 17.

—WE ALSO BUILD—

ALL KINDS OF

Mining, Milling, Concentrating, Pumping, Air Compressing, Hydraulic, Water Wheel, and Hoisting Machinery.

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—We publish sixteen catalogues. Write for one in the line you are interested in.—

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Manufactured from the best quality of projectile steel—which is stronger and tougher than any heretofore used—the best shoe and die ever made. Will crush more ore per pound of steel than any other. Will not chip or cup and will outcrush any other made. Wear smooth and true with hardly any perceptible decrease in their size, and those who use them say, "We never had shoes and dies wear so long." Send for circulars and dimension blanks to

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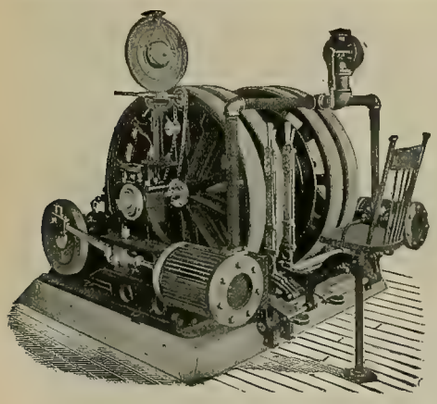

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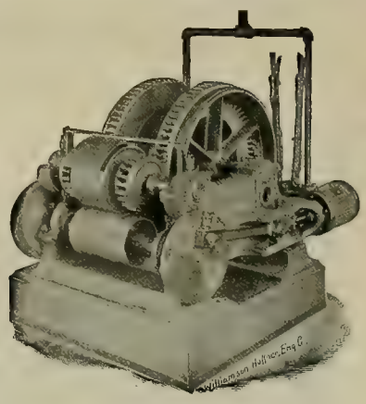

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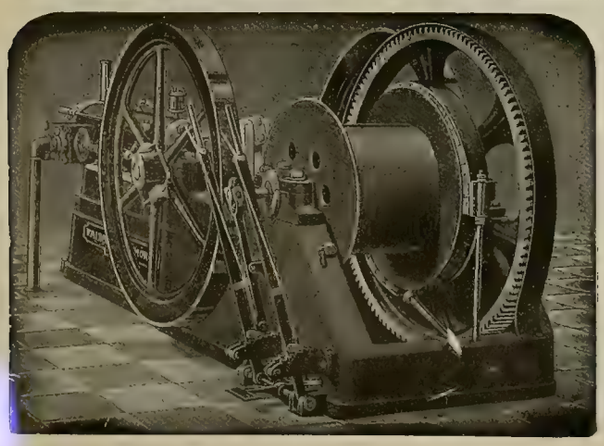

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ALL SIZES UP TO AND INCLUDING 54 HORSE POWER.
For Pumping, Milling, Lighting, Air Compressors, Etc.

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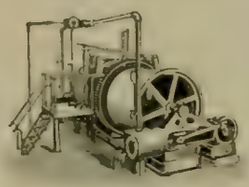

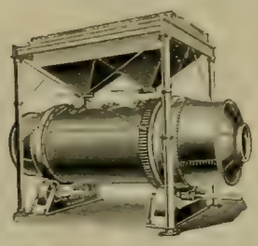

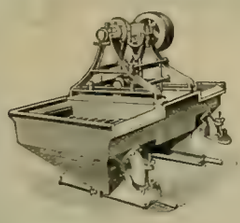

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This is a type of a very strong, well-designed machine, single or double drum.

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In this line we have equipped some of the most important plants. We furnish all the accessories of a complete installation.

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We take special pride in directing attention to a first-class jig shown in this cut.

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This specialty is strictly up-to-date, with every possible feature of a perfect plant. We have introduced some very important features in copper converter installations.

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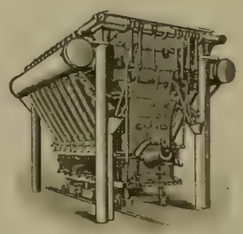
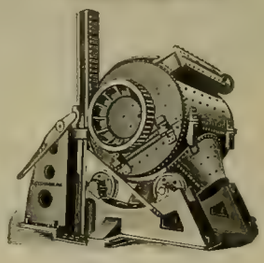
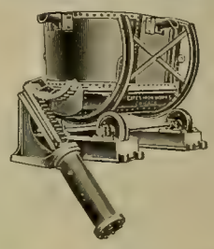
This small cut will give an idea of the construction of this machine. All the cuts in this ad. made direct from the originals on our shop floors.







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ARE MANUFACTURED IN

Great Variety FOR MINING PURPOSES Operated by

Steam, Air, Electric or Water Power.

Vertical SINKING PUMPS, Bucket or Double Plunger Pattern.

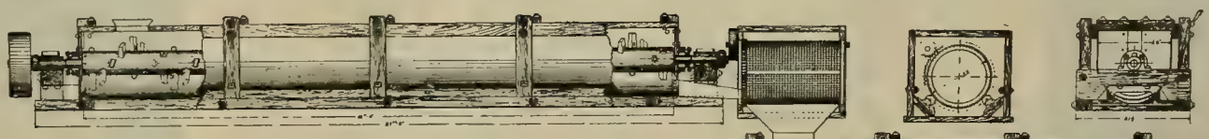
Deep Mine STATION PUMPS.

MAKE KNOWN YOUR WANTS TO THE : : :

GEO. E. DOW PUMPING ENGINE CO.,

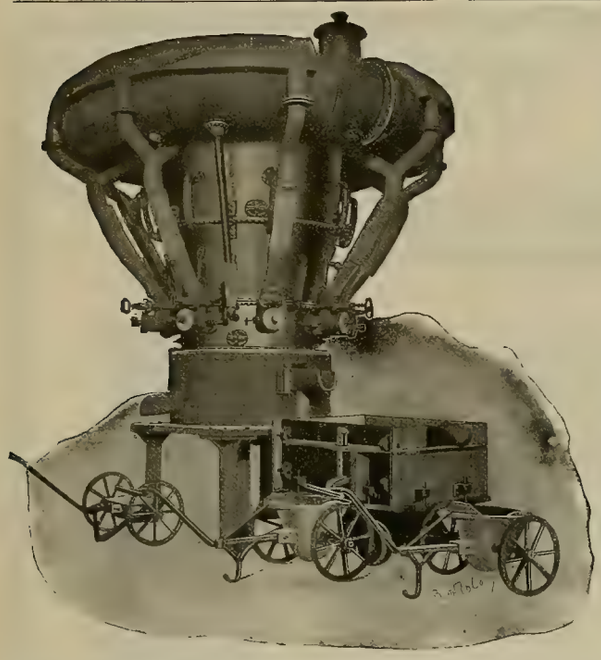
Successors to the DOW STEAM PUMP WORKS. SEND FOR CATALOGUE. SAN FRANCISCO, CAL.

THE SNODGRASS COMMON SENSE PULVERIZER AND CONCENTRATOR.



This is the most successful machine yet discovered for working gravel, cement, clay, etc. It avoids crushing the rocks, which are washed clean, while at the same time it pulverizes the Cement or Clay, and **saves the Gold although it is as fine as flour.** It is only necessary to have from 4 to 6 miner's inches of water to work 150 tons or more every twenty-four hours. The machinery consists of two iron troughs or "concaves," each 26″ in diameter, one of which is about 18′ and the other 12′ long. In these troughs are strong revolving shafts with projecting teeth, made of White Iron, 2¾″ wide by 1¼″ thick, placed in spiral form around the shaft about 2″ apart, forming a conveyor. The first shaft is geared to make from 150 to 250 revolutions per minute, and the second one from 300 to 500. There is a revolving screen between the two troughs that takes out the coarser rocks after being washed, and only the finer material runs into the second trough, and is there worked thoroughly. There is a space of about 4″ in the bottom of each trough, or "concave," that fills up with gravel and sand. When the gold is free it settles into this, and as the teeth do not disturb the bottom, the gold remains there until a cleanup is made. In many cases the 18′ machine alone is needed, as the two are only used where we have hard Cement or Clay to work. It requires from 10 to 12 H. P. to run the complete machine, and from 6 to 8 H. P. for the 18′ one alone. I also manufacture a 6′ machine about one-half the diameter of the others, and lighter in proportion, to be run by hand power, with small amount of water, and capacity of about two tons per hour. This can be easily moved from place to place.

For Testimonials and Particulars, Address : : : S. K. SNODGRASS, Denver, Colo. (The Windsor.)



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OUR SPECIALTIES:

MILLS AND SMELTERS

FOR THE TREATMENT OF ANY OR ALL KINDS OF ORES.

We design, manufacture, erect and fully equip them, for any desired capacity.

In writing for information, give us analysis or character of ore to be treated, to enable us to intelligently arrive at the proper method.

SPECIAL CATALOGUES on Smelting, Concentration, Amalgamation, Cyanide, Chlorination, Crushing, etc., mailed on application.

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Established 1860. DENVER, COLO., U. S. A.

THE MINE AND SMELTER SUPPLY CO.,

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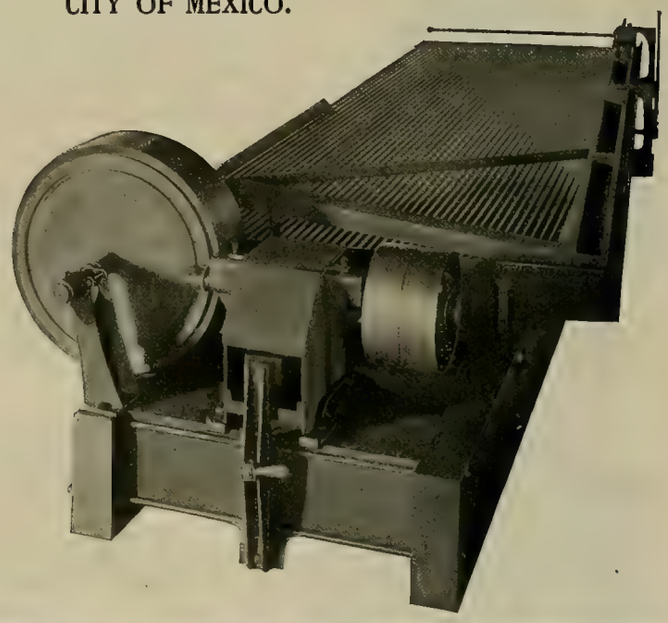
Sole Agents for

The . . . . . Wilfley . . . Concentrating Table . . . .



The most satisfactory concentrating table now in use.
It will give better net returns than any other machine.
It will make a satisfactory saving on the finest slimes or will handle pulp as coarse as 8-mesh to equal advantage.
The Wilfley Table is made only under the personal supervision of the inventor. It is built right and all possible improvements are embodied in the later machines.
Send for circulars describing the latest improved table.

ROOFING COST.

Every builder should consider well the cost of roofing.

There is no economy in a cheap roof, for it is only a question of time until needed repairs double the original cost.

The first cost of P. & B. Ready Roofing may be a trifle higher than other roofings, but the first cost is the end of your roofing investment.

P. & B. Ready Roofing outlasts and outwears all other roofs. Heat, cold, snow, rain, wind, acids, fumes, smokes, or anything else will not injure a P. & B. roof. It lasts as long as the building it covers, and is by far the cheapest roof in the long run.

Send for free booklet. Address Dept. A.

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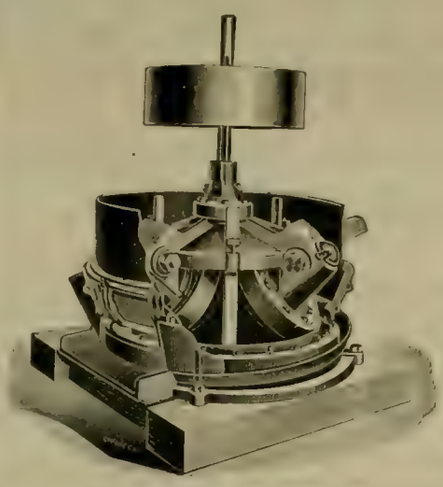

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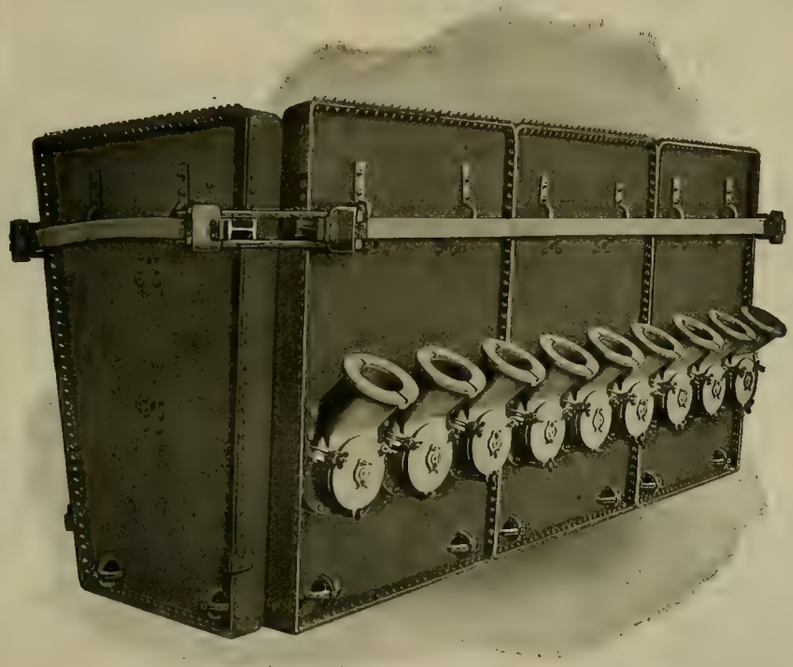

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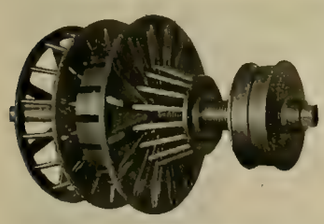

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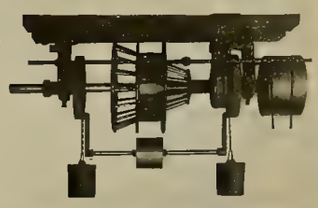

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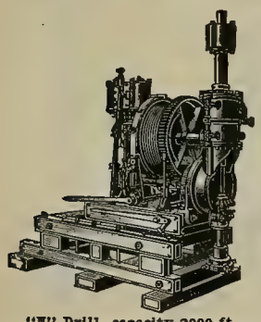

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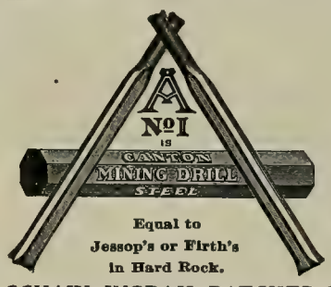

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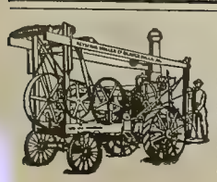

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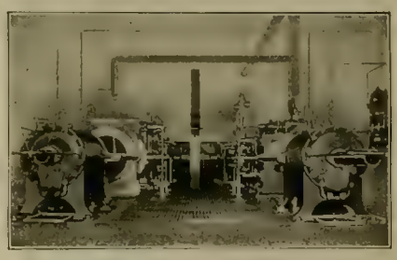

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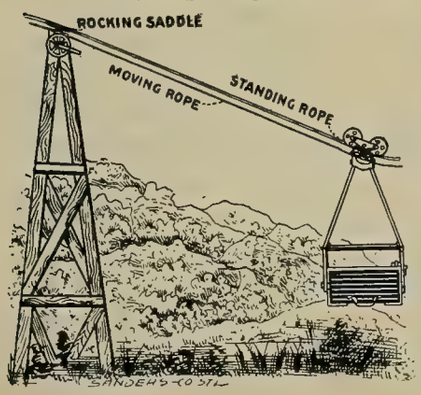

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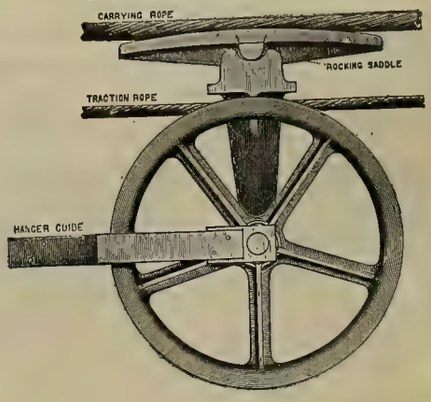

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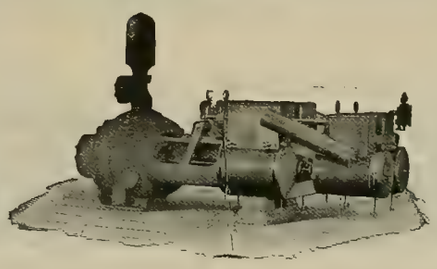

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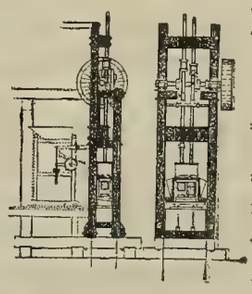

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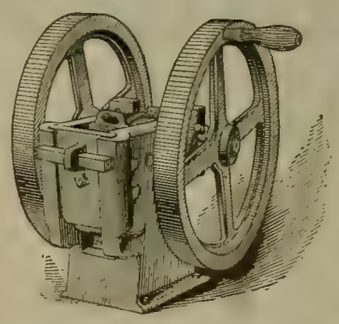

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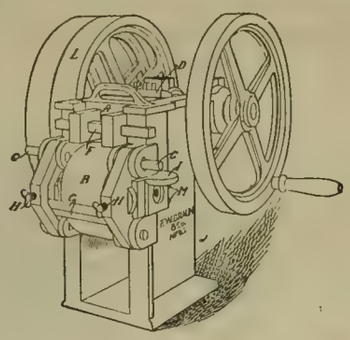

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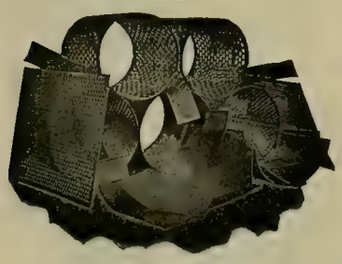

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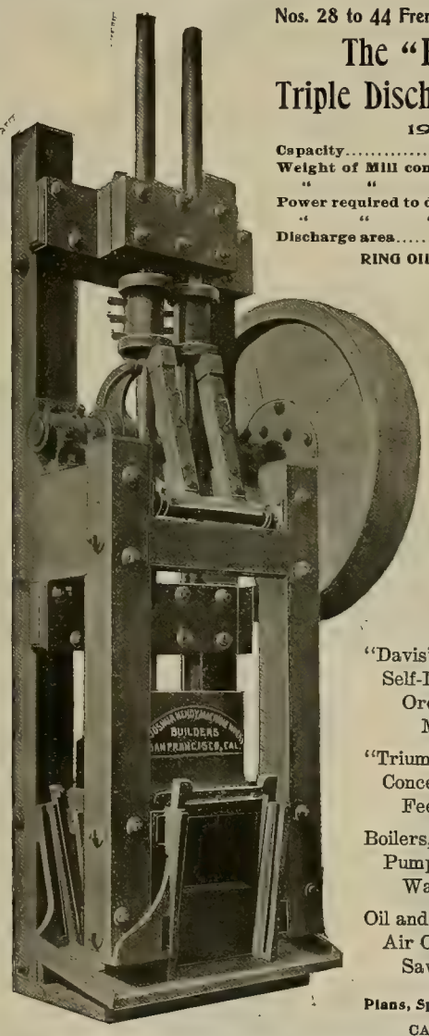

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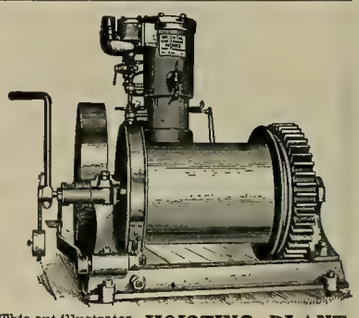

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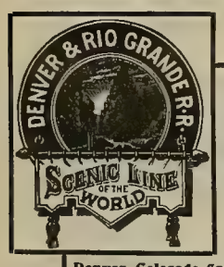

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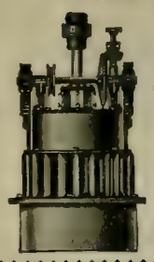

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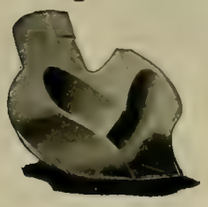

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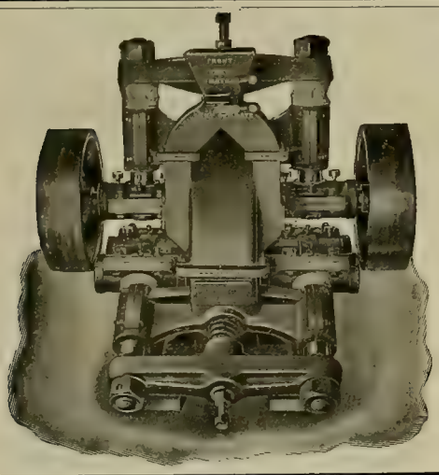

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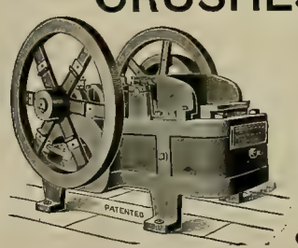

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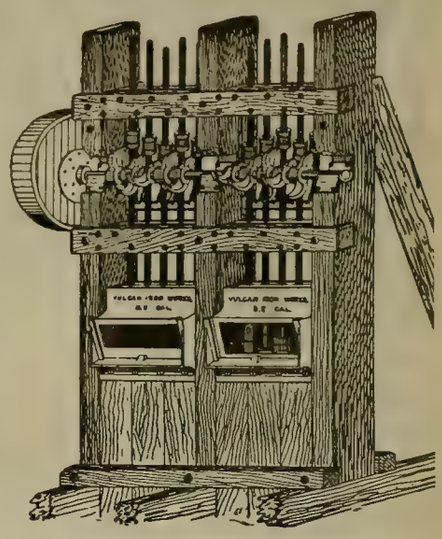

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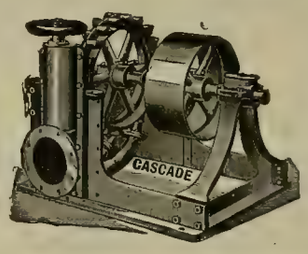

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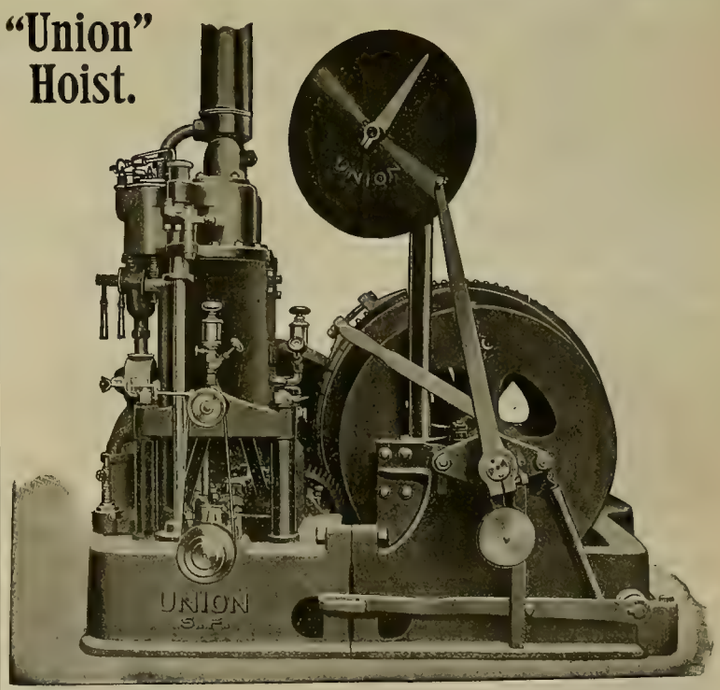

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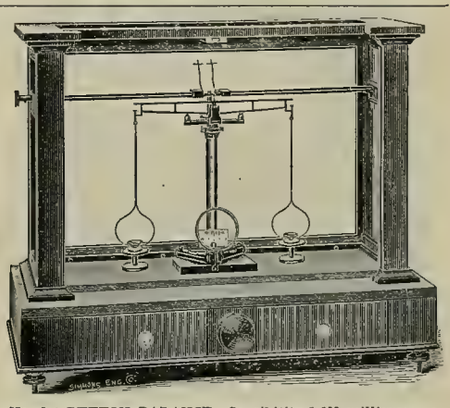

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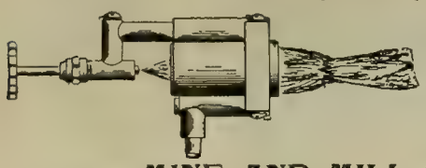

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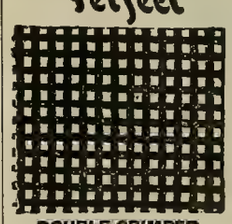

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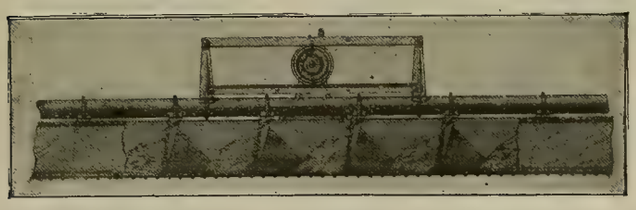

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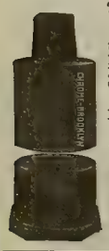

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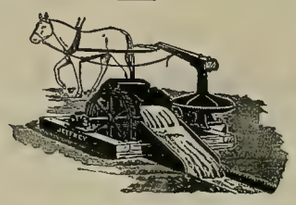

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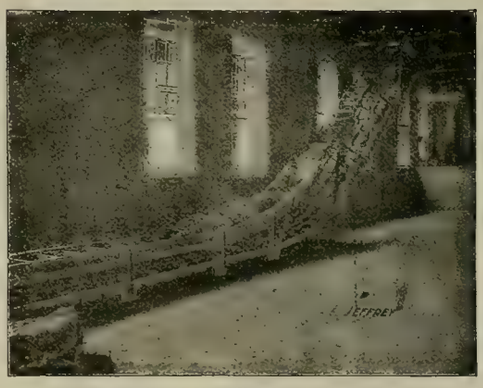

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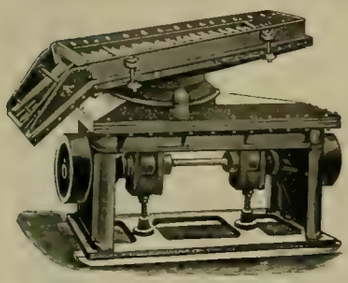

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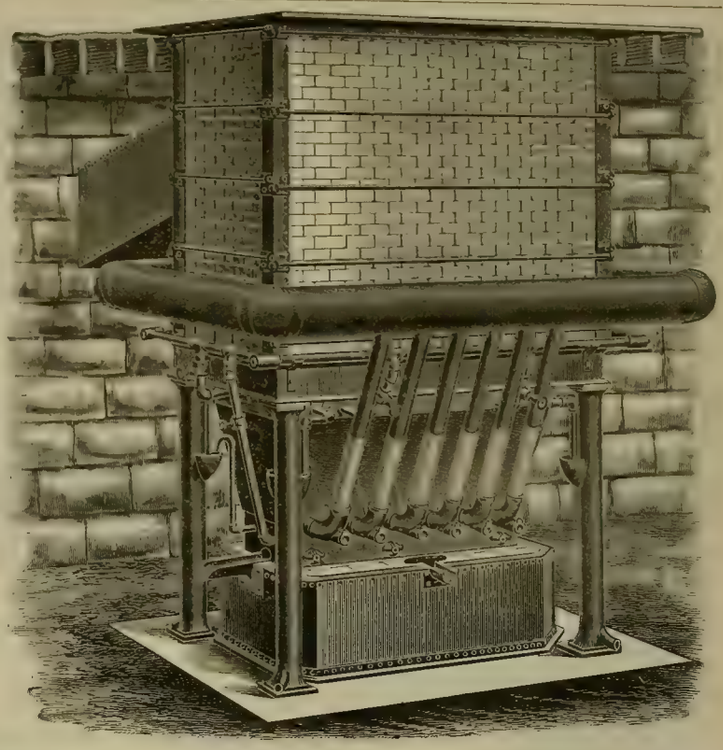

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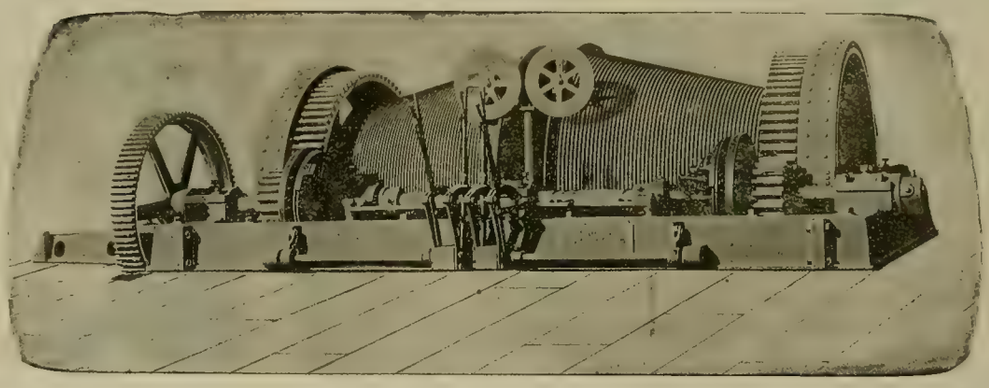

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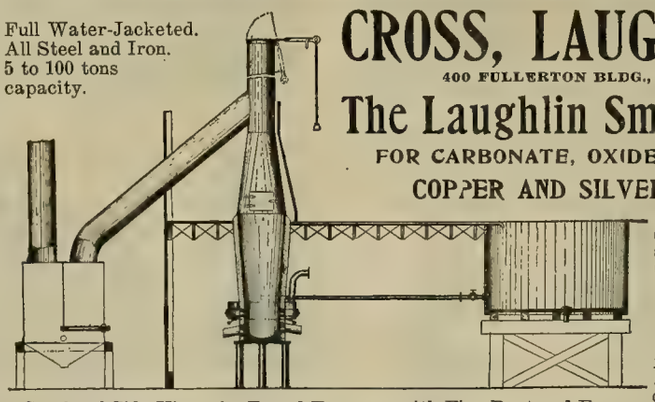

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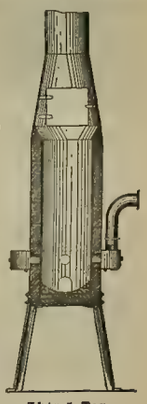

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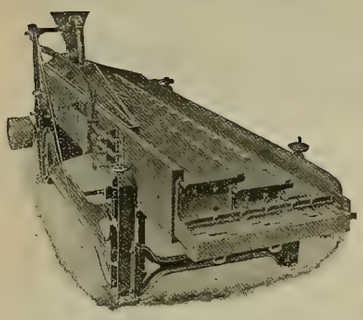

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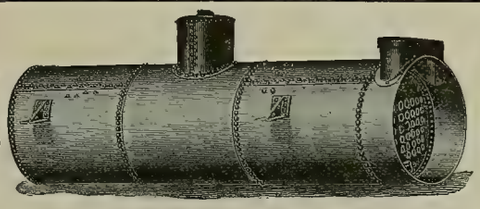

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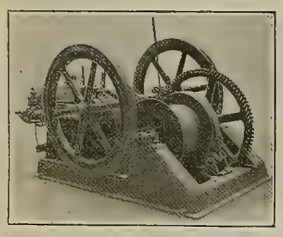

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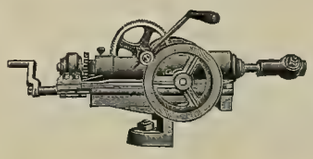

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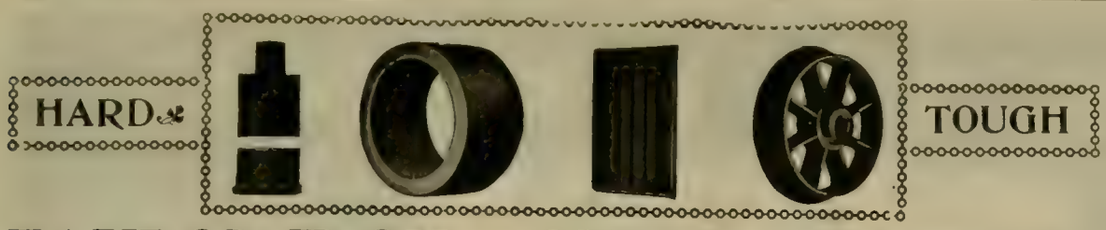

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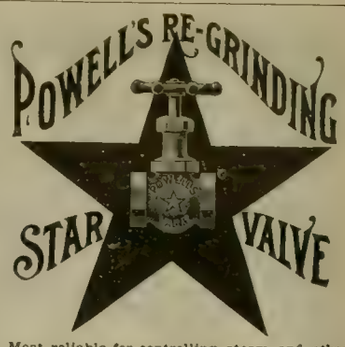

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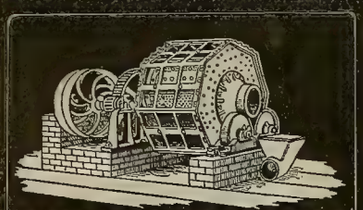

THE SMIDTH BALLMILL

LET US ESTIMATE

on plan or equipment for your new grinding plant, or on changes or additions to your present outfit. Our grinding and pulverizing machinery is the Standard of America for reducing or pulverizing ore, cement-rock, and refractory substances generally. We are always ready to prepare estimates, submit plans or demonstrate the superiority of

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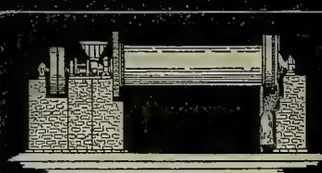
By way of introduction let us send Catalogs.



THE DAVIDSEN PATENT TUBEMILL

COPENHAGEN, Vestergade 29K. **F. L. Smidth & Co., Engineers,** 66 MAIDEN LANE, N.Y. LONDON, 9 Bridge St., S.W.

225

ASSESSMENT NOTICES.

MARIPOSA COMMERCIAL AND MINING COMPANY.—Location of principal place of business, San Francisco, California; location of works, Mariposa County, California.

Notice is hereby given, that at a meeting of the Board of Directors, held on the 13th day of April, 1901, an assessment (No. 22) of Ten ($10) Dollars per share was levied upon the capital stock of the corporation, payable immediately in United States gold coin, to the secretary, at the office of the company, Room 223 Crocker Building, San Francisco, California.

Any stock upon which this assessment shall remain unpaid on the 25th day of May, 1901, will be delinquent, and advertised for sale at public auction; and unless payment is made before, will be sold on MONDAY, the 17th day of June, 1901, to pay the delinquent assessment, together with the costs of advertising and expenses of sale.

By order of the Board of Directors.

ALEX. GRANGER, Secretary.

Office—Room 223 Crocker Building, San Francisco, California.

EUREKA CONSOLIDATED DRIFT MINING COMPANY.—Location of principal place of business, San Francisco, California; location of works, Placer County, California.

Notice is hereby given, that at a meeting of the Board of Directors, held on the 25th day of April, 1901, an assessment (No. 30) of one (1) cent per share was levied upon the capital stock of the corporation, payable immediately in United States gold coin, to the secretary, at the office of the company, 214 Pine street, room 31, San Francisco, California.

Any stock upon which this assessment shall remain unpaid on the 28th day of May, 1901, will be delinquent and advertised for sale at public auction; and unless payment is made before, will be sold on TUESDAY, the 18th day of June, 1901, to pay the delinquent assessment, together with the costs of advertising and expenses of sale.

By order of the Board of Directors.

GEO. W. DIXON, Secretary.

Office—214 Pine street, room 31, San Francisco, California.

NATIONAL CONS. MINING COMPANY.—Location of principal place of business, San Francisco, California; location of works, Rich Gulch, Shasta County, California.

Notice is hereby given, that at a meeting of the Board of Directors, held on the 16th day of April, 1901, an assessment (No. 14) of five (5) cents per share was levied upon the capital stock of the corporation, payable immediately in United States gold coin to the secretary, at the office of the company, 773 Mission St., San Francisco, California.

Any stock upon which this assessment shall remain unpaid on the 1st day of June, 1901, will be delinquent, and advertised for sale at public auction; and unless payment is made before, will be sold on TUESDAY, the 25th day of June, 1901, to pay the delinquent assessment, together with the costs of advertising and expenses of sale.

By order of the Board of Directors.

GEO. W. FLEISSNER, Secretary.

Office—773 Mission St., San Francisco, California.

OSCEOLA CONSOLIDATED MINING COMPANY.—Location of principal place of business, San Francisco, California; location of works, Plymouth, Amador County, California.

Notice is hereby given, that at a meeting of the Board of Directors, held on the 23d day of April, 1901, an assessment (No. 11) of one (1) cent per share was levied upon the capital stock of the corporation, payable immediately in United States gold coin, to the secretary, at the office of the company, 307 Montgomery street, San Francisco, California.

Any stock upon which this assessment shall remain unpaid on the 25th day of May, 1901, will be delinquent, and advertised for sale at public auction; and unless payment is made before, will be sold on MONDAY, the 17th day of June, 1901, to pay the delinquent assessment, together with the costs of advertising and expenses of sale.

By order of the Board of Directors.

HOLLAND SMITH, Secretary.

Office—307 Montgomery street, San Francisco, California.

THE KLONDIKE OF ARIZONA.

THE **Prescott** AND **Eastern Railroad**

ENTERS AN

Extremely Rich Mining Country.

The opening of this road makes easy of access one of the Richest Gold and Copper Mining Districts in the World. Hundreds of prospectors are turning their attention to this section.

Take the Santa Fe System to Ash Fork, thence via the SANTA FE, PRESCOTT & PHŒNIX RY. to Prescott. This latter road also reaches Wickenburg, where is located the great Vulture Gold Mine and where the recent marvelous gold strike was made in the Oro Grande.

For further information and descriptive literature, address H. P. ANEWALT, Gen. Frt. & Pass. Agt., PRESCOTT, ARIZ.

DELINQUENT SALE NOTICE.

SOUTH SLIGER GOLD MINING COMPANY.—Location of principal place of business, San Francisco, California; location of works, El Dorado County, California.

Notice.—There are delinquent upon the following described stock, on account of assessment (No. 1) levied on the 25th day of March, 1901, the several amounts set opposite the names of the respective shareholders, as follows:

Names.	No. Cert.	No. Shares.	Amt.
V. W. Crysler	6	160	$3 20
W. P. Keeney	7	500	10 00
W. P. Keeney	8	500	10 00
W. P. Keeney	9	100	2 00
C. W. Keeney, Trustee	13	200	4 00
C. W. Keeney, Trustee	14	200	4 00
C. W. Keeney, Trustee	15	1,000	20 00
Fred. Lass	19	1 000	20 00
Fred. Lass	20	4,000	80 00
E. W. Newth	22	500	10 00
F. W. Keeney	23	400	8 00
T. F Keys	24	500	10 00
D. K. B. Sellers	25	500	10 00
Fred. Lass	29	1,340	26 80
L. Ariani	31	250	5 00
V. Ariani	32	250	5 00
W. A. Mitchell	35	1,000	20 00
A. C. Baumgartner	38	500	10 00
W. A. Mitchell	42	2,000	40 00
Fred. Lass	43	500	10 00
Ira D. Orton and L. A. Maison	44	500	10 00
Ira D Orton and L A Maison	45	500	10 00
R. E. Starr	52	500	10 00
W. A. Mitchell	53	1,000	20 00
Fred. Lass	54	1,000	20 00
Fred Lass	5	1,000	20 00
A. C. Baumgar ner	58	1 000	20 00
A. W. Mitchell	59	1 000	20 00
Fred Lass	61	1 000	20 00
C. W. Keeney	62	200	4 00
C. W. Keeney	63	200	4 00
C. W. Keeney	64	4,000	80 00
C. W. Keeney	65	2 000	40 00
R. W. Bender	66	2,000	40 00
L. Ariani	67	160	3 20
A. F. Baumgartner	71	400	8 00
W. A. Mitchell	72	500	10 00
W. A. Mitchell	73	500	10 00
J. C. D nnelly	76	1,000	20 00
C. W. Keeney	77	2,000	40 00
R. W. Bender	78	1 000	20 00
Jas. A. Kerr	79	1,000	20 00
A. F. Baumgartner	80	5,000	100 00
G. A. Conro	81	2,000	40 00
C. W. Keeney	82	76,100	1522 00

And in accordance with law, and an order from the Board of Directors, made on the 25th day of March, 1901, so many shares of each parcel of such stock as may be necessary, will be sold at public auction at the office of the company, Room 8, 402 Front street, San Francisco, California, on MONDAY, the 27th day of May, 1901, at the hour of 12 o'clock M. of said day, to pay said delinquent assessment thereon, together with costs of advertising and expenses of sale.

J. L. DANIELS, Secretary.

Office—Room 8, 402 Front street, San Francisco, California.

POSTPONEMENT.

The date of sale of the foregoing delinquent stock has been postponed from May 27th, 1901, to MONDAY, the 3d of June, 1901.

By order of the Board of Directors.

J. L. DANIELS, Secretary.

Office—Room 8, 402 Front street, San Francisco, California.

DELINQUENT SALE NOTICE.

LARKIN MINING COMPANY.—Location of principal place of business, San Francisco, California; location of works, near Placerville, El Dorado County, California.

Notice.—There are delinquent upon the following described stock, on account of assessment (No. 10) levied on the 12th day of March, 1901, the several amounts set opposite the names of the respective shareholders, as follows:

Names.	No. Cert.	No. Shares.	Amt.
T. W. Baker	201	250	$5 00
T. W. Baker	202	250	5 00
T. W. Baker	203	250	5 00
T. W. Baker	209	250	5 00
J E Kraffts	271	250	5 00
J. E. Kraffts	354	250	5 00

And in accordance with law, and an order from the Board of Directors, made on the 12th day of March, 1901, so many shares of each parcel of such stock as may be necessary, will be sold at public auction at the office of the company, 112 Main street, San Francisco, California, on WEDNESDAY, the 15th day of May, 1901, at the hour of 2 o'clock P. M. of said day, to pay said delinquent assessment thereon, together with costs of advertising and expenses of sale.

N. F. REMINGTON, Secretary.

Office—112 Main street, San Francisco, California.

—: THE :— IMPROVED **Ammonia Process**

treats successfully oxidized and sulphide copper ores. Information free of charge. Mail average samples and $10.00 and receive full report and analysis. Processes and mines examined and reported upon. Pocketbook Am. Process, full description, 50 cents. Instructions in chemistry, lixiviation, and mining engineering. Office and laboratories, 334 Kearny St., San Francisco, Cal.

H. HIRSCHING.

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RIGID, SIMPLE, DURABLE, EFFICIENT, ECONOMICAL.

No trouble to install. No keys or wedges to adjust. No alteration of mill necessary. Effect a saving in friction losses. Each stem can be removed independent of the others. Costs no more than wooden guides.

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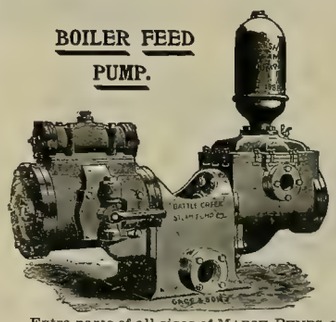

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Extra parts of all sizes of MARSH PUMPS carried in stock and repairing done in the best manner. We also set up our pumps when required at cost and guarantee every pump to give satisfaction.

Our New Pump Catalogue Will Be of Interest to You. Mailed Free. Send for One.

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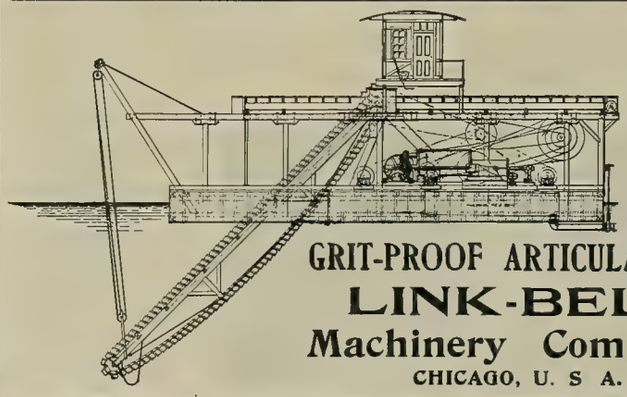

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For Placers, Water Powers, Irrigation, Etc.

THE WEIGELE PIPE WORKS

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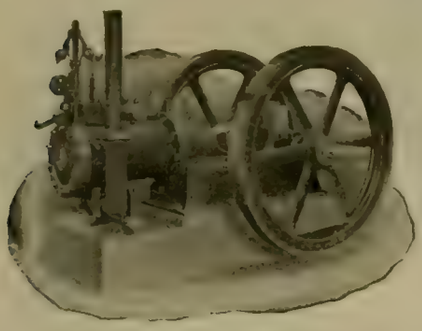

HERCULES stands for the best, for the most improved — Gasoline Engine. Special attention given to hoists and mill engines for mines. 2½ to 400 H. P. New catalogue Jan. 1st.

HERCULES GAS ENGINE WORKS,
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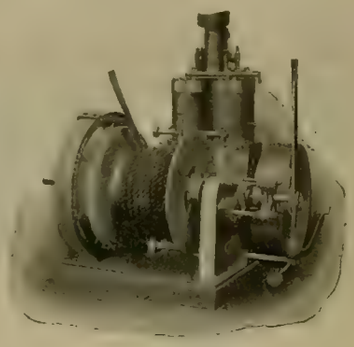

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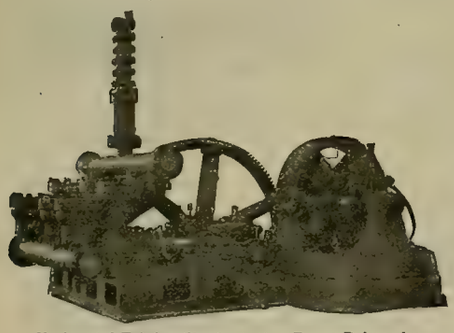
GENERAL ELECTRIC COMPANY'S



Horizontal Triplex Single Acting Pump Driven by GE Direct Current Motor.

Electric Pumps

may be run automatically, may be controlled from any point in the mine, and will give the highest efficiency independent of the level to which the water is to be raised.

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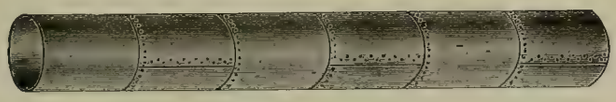

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BEST ANTI-FRICTION METAL FOR ALL MACHINERY BEARINGS. FOR HIGH SPEED AND HEAVY CRUSHING WEIGHT IT HAS NO EQUAL.

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Manufacturers of all grades Babbitt Metals, Solder, Bar Tin, Bar Lead, Lead Car Seals, Pig Tin, Pig Lead, Antimony, Copper, Spelter, etc.

Under date Feb. 1, 1901, Mr. O. F. Kuencer of Kingman, Ariz., writes:

"The 35 H. P. Weber Gasoline Engine driving my concentrating mill and four tables, put in **8 years ago,** still does good work. I have run 24 hours a day without stops a month or two at a time."

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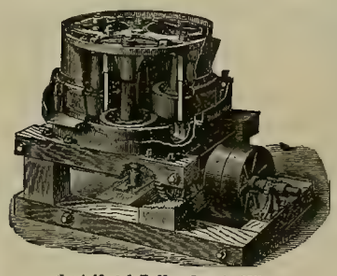

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Roller Quartz Mills.
CONCENTRATORS and ORE CRUSHERS.
Mining Machinery of Every Description
Steam Engines, Shingle Machines.
Room 1, 3d Floor, Mills Building,
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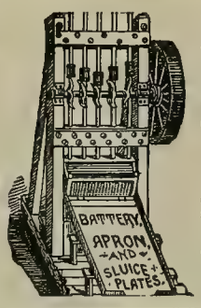

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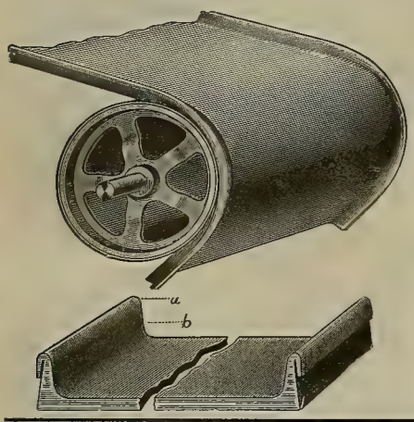
THE BROWNELL "PATENT LIP" FLANGE FRUE VANNER BELTS.



It has taken years of ceaseless testing and experimenting to produce the superior belt which we now offer, with elastic flanges and pliable body reinforced with specially woven duck. Every belt is manufactured by experienced workmen, and carefully tested on machines especially built for that purpose; consequently we are to-day manufacturing the best belts that mechanical ingenuity, combined with honesty of construction, can possibly produce.

RAWHIDE GOLD MINING COMPANY,
JAMESTOWN, TUOLUMNE CO., CAL., Feb. 21, 1897.

J. S. BROWNELL, ESQ.—DEAR SIR: Replying to your query of Feb. 15th, will say that I have used your Patent Lip flange belt more than one year, and judging from their appearance after more than one year of hard service, I do not hesitate to say that they are the best belt I have ever used and I take great pleasure in testifying to the fact. Yours truly, W. A. NEVILLS, President.

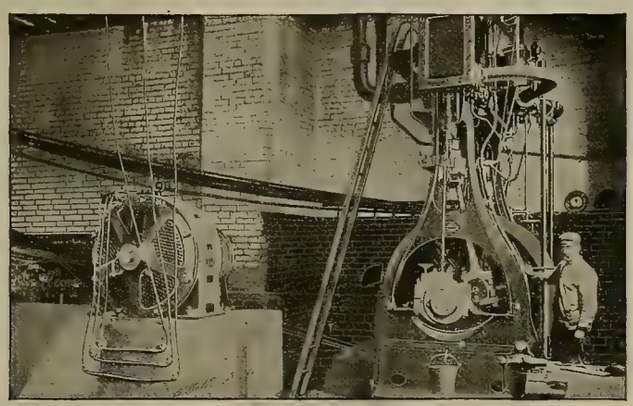
AMADOR CITY, CAL., Feb. 18, 1897.

MR. J. S. BROWNELL—DEAR SIR: I take pleasure in saying that I have used your Patent Lipped flange belt for several years while connected with this company, and I consider them the best that we have used. The quality of rubber in the flange seems to be the best, and we are not bothered with the flange cracking and thereby destroying the life of the belt. At present we are using 14 concentrators, and have in use several kinds of belts. We consider your Patent Lipped flange the best. Yours very truly, THE CONS. SOUTH SPRING HILL G. M. CO.
By JOHN R. TREGLOAN, Superintendent.

For any information regarding Frue Vanner or Belts, call on or address

JAS. S. BROWNELL, Western Agent FRUE VANNING MACHINE CO.

(Successor to Adams & Carter.) 132 MARKET STREET, ROOM 15, SAN FRANCISCO.



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For Transporting Ore, Fuel, Earth, Sugar Cane, etc., by Wire Ropes.

SIMPLE, ECONOMICAL, PRACTICAL, DURABLE.

LOADS MECHANICALLY. DUMPS AUTOMATICALLY.

WIRE TRAMWAYS (Single and Double Rope Systems),

CABLEWAYS, TRANSMISSION BY WIRE ROPES, CABLE GRIPS, INCLINE PLANES, LOGGING BY CABLES, AUTOMATIC LOADERS,

PLOWING, SCRAPING AND TRANSPORTING by Wire Ropes,

DESIGNED, SUPPLIED AND ERECTED. Estimates Furnished.

AGENCIES: Hendrie & Bolthoff, Denver, Colo.; Scott-Strevell Hardware Co., Salt Lake City, Utah; George A. Lowe Co., Ogden, Utah; P. Basche, Baker City, Oregon.

CALIFORNIA WIRE WORKS, - 9 Fremont St., San Francisco, Cal.

Improved GRIP PULLEY.

Patents Nos. 483,442; 610,358.

EFFECTIVE, SIMPLE, AUTOMATIC.

Saves Wear on Wire Rope and Cable.

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Heavy Duty Frame,
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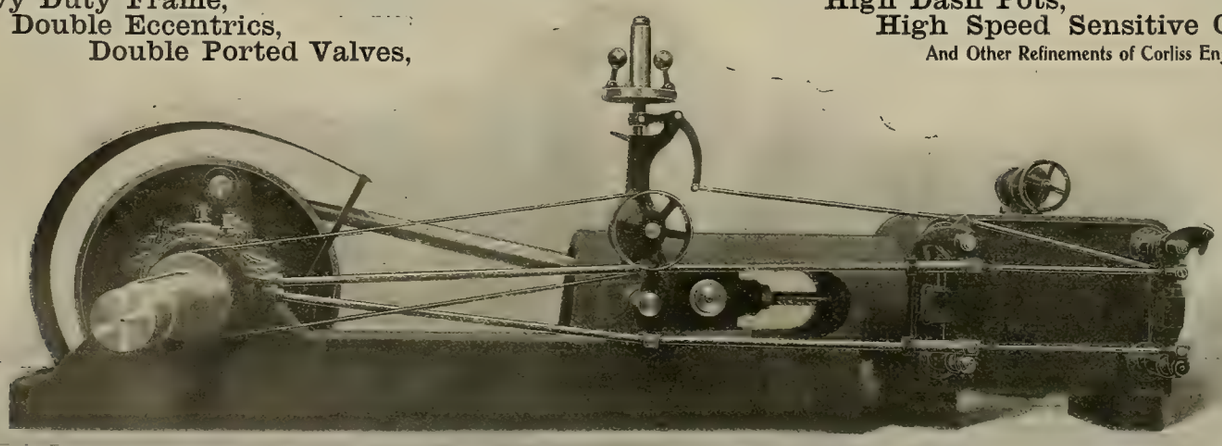
High Dash Pots,
High Speed Sensitive Governor,
And Other Refinements of Corliss Engine Practice.



CATALOGUE AND ESTIMATE UPON APPLICATION.

PARKE & LACY CO., 21 Fremont St., San Francisco, Cal.

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MINING AND SCIENTIFIC PRESS.

Whole No. 2131.—VOLUME LXXXII. Number 21. SAN FRANCISCO, SATURDAY, MAY 25, 1901. THREE DOLLARS PER ANNUM. Single Copies, Ten Cents.

The Three Stars Mine, Ophir, Placer County, Cal.

The Three Stars mine is one of the oldest quartz discoveries in Placer county—not later than the third. It had on it one of the first quartz mills erected in California—in 1854. Massive outcrops of quartz stood 15 feet high out of the soil into which the country rock formation had decomposed, and showing gold the early miners put up a mill. The venture was not successful, and appears to have been abandoned without any underground work except a couple of shallow pits in the outcrop.

For a long time after this early attempt the miners left the quartz alone and confined their activities to the rich, shallow placers of the flat ravines leading up to the great vein. In the early '70s when the quartz mining of the adjacent town of Ophir was at its height, and its mines—notably the St. Patrick—were the basis of more or less stock manipulation in the San Francisco exchanges, an old German named Kittler located the abandoned ledge and sinking half a dozen shallow shafts, the deepest only 90 feet, from another part of the ledge than the scene of the first working, took out a small fortune. Shortly afterward dying, his heirs abandoned the mine. In 1879 it was again located by four miners—the Peardon brothers and the Hawkens brothers. These men had no capital but their ability to work. They sunk a new shaft, found gold almost from the start, crushed a little of the ore in a custom mill and with the returns from it bought an old mill, set it up on the mine and commenced to pound out of the rock a comfortable living and the beginning of a modest fortune. Gradually their operations extended. Other shafts were sunk, the first one was deepened to 360 feet, a substantial steam hoist was erected and by 1885 they had taken out and expended in their living and in improvements on the mine about $70,000.

Then the fortune of the mine turned. First one of the Hawkens brothers had his life crushed out of him by a cave in the mine where at the time he was working alone. Later their costly hoisting works were destroyed by fire. Again, a few months after, the two Peardon brothers and the other Hawken brother were smothered to death, the shaft building catching fire while they were working on the 300-foot level down another shaft.

Dumps of Morning Star Shaft, Three Stars Mine, Ophir, Placer Co., Cal.

For several years again the mine lay closed. In 1894, having been acquired by the immediate grantors of the present company, attempts were made to develop it with insufficient capital. The surface had been robbed and it was necessary to gain depth to open new ground. The capital employed sufficed to construct some excellent surface improvements, to clean out and deepen the old corkscrew incline shaft over which the hoisting works had been burned, and to start the North Star vertical shaft.

Ultimately, in 1897, the present owner, the Three Stars Mining Co., bought it and with ample capital at its command has since then been "making the mine." The illustrations show the character of the surface betterments. The site of the mine is on the summit of the first bench rise in the foothills from the Sacramento valley, about 500 feet elevation above tide water.

The soil and climate and abundant water for irrigation make possible the touch of landscape art that has beautified at a trifle of cost the roughness and raggedness of a working mine. The buildings for offices and employes are conveniently disposed on a broad roadway. The mine hoists are substantial and perfectly appointed structures. The Morning Star vertical shaft is down 1100 feet. The 300, 500 and 700-foot levels have been run out, the latter for 1700 feet, blocking out stopes. The Belmont shaft has been put down to 541 feet, with 500 feet of drifting on each of the 300 and 500-foot levels. On the Almont, a parallel ledge, there is a vertical shaft now down 524 feet, with stations cut at 300, 400 and 500 feet. So far there has been no stoping of ore, the dumps coming from the levels and other openings. Now that the ground is opened up, insuring the ore supply, the site is being prepared for a 40-stamp mill, twenty of which are expected to be put in this season.

The country rock formation in which the ledge strikes generally north and south is grano-diorite. The contact line with amphibolite is about a quarter of a mile north and courses at almost right angles to the lode strike. The dip of the ledge is about 80° to the east. The ore bodies are lenticular, wide in places, narrow in others. The main system of veins of the district strikes is, roughly, parallel—northwest and southeast—to the contact described.

Buildings of Three Stars Mine, Ophir, Placer Co., Cal.

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THE making of the cities of the Great Lakes into ocean ports is of considerable benefit to the miners of the Rocky Mountain States. The surplus production of metal of these States can be laid down at the seaports of Europe at practically no greater total cost of transportation than now is the rail cost to the Atlantic coast alone. The lead producing industry is in need of this help to larger profits and should take advantage of it.

THE mine owners at Reno, Nevada, propose to form an association to generally foster and be protective to the mining industry. Only within the last few weeks has the mining industry of this locality shown promise of future magnitude, yet the early action toward organization is to be commended. Care should be taken by the organizers to keep the mutually protective character of their organization to the front. The organization should not permit itself to become a brass band to attract the outside investor. Good mines advertise themselves and bring investors. If half the local papers state regarding the local mining is fact, the mines around Reno will make themselves without the assistance of outside capital. For the future of both Reno and the mines, they are the better off for developing within and from themselves. The mining districts that excuse lack of development by the absence of outside capital are not as inviting to outside capital as the districts in which the mines themselves are capital.

THE Canadian Government, it is reported, has decided to pay a bounty on lead refined in Canada of $5 per ton, not exceeding $100,000 annually. In direct effect this does not seem very much, but indirectly it cannot fail to influence the price of lead in the foreign market. The establishment of the refinery in British Columbia will not only give the direct bounty of $5 a ton, but it will give as well a large indirect bounty, amounting to the freight on the ore or on crude lead from the mines to San Francisco and the return freight on the lead from San Francisco to Canada. The lead which does not get the direct Government bounty will get the indirect bounty of freight money saved, and the annual production can easily be made to far outrun the 20,000 tons annually the bounty would provide for. Conditions have been such without the refining that the lead from the mine was worth slightly less than nothing, as a producer explained it; but it had to be separated from the silver by refining. With the refinery, the lead will at least be worth the bounty, and many Canadian mines now inoperative will be able to resume with a profit margin. The effect of the increase in production can reasonably be counted on to reduce the London price, and to reduce the return from the surplus United States production marketed abroad. Ultimately the sum total of this will be distributed to the mine producers of the United States in lowered prices, unless the American Smelting & Refining Company decides to pay it, just as it pays the freight on the lead from the refineries in Colorado to New York. It is to be hoped the economies of consolidation will permit it to do so.

Leadville's Opportunity.

This paper last week pointed out to Leadville the real weak point in her economy as a city dependent on the mining industry, and suggested the remedy. Leadville has more than the ordinary run of good fortune. The Supreme Court of Colorado has this week decided that the city of Leadville owns her streets and roadways in fee—that the minerals beneath the surface belong to it as well as the mere right of use of the surface. The telegrams state that it is estimated the back royalties that Leadville will receive under the decision will amount to $2,000,000. Probably this large sum is more or less imaginative, but the amount should be considerable enough to provide for such public utilities as water, light, street paving and schools, and for the ownership of the spur tracks from the mines to the main lines of railroad or to the treatment works. The decision has made it possible for Leadville to do this and the opportunity should not be lost. The suggestion of this paper as to the local ownership of the mine spur branches did not have in view public ownership as is now possible, but contemplated merely ownership by citizens and residents of Leadville, thus insuring a local distribution of the local transportation earnings. It is the fact that is essential, however, and the distribution of the earnings is more certain in local public ownership than in local private ownership.

Leadville is practically in the position of having forced on her the association of miners and mining interests that this paper has advised to be undertaken voluntarily. Without the responsibility of detail in the mining, she will have some of its earnings—in the aggregate a larger proportion than before. At the same time Leadville will have the responsibility of ownership. The ores beneath the streets have got to be mined to benefit her. Fairness and moderation in the amount of royalties, and disposition of them in providing such public utilities that the miners shall indirectly receive the benefit of the expenditure, are essential business methods of the novel proposition. As opposed to the reorganization of the mining industry that is being undertaken by business interests which did not make the industry, Leadville has an opportunity to initiate reorganization of her part of the industry from the end of her interest in it. The utility she makes of her opportunity is worth watching.

FROM trade and consular reports the situation as regards copper production would seem to be favorable, and indicate that ordinary trade conditions of short supply and steadily increasing consumption will maintain profit-earning sale prices for the metal for a considerable period in advance of the present time. Despite the stimulation of nearly doubled prices for over two years countries other than the United States and Mexico have not increased production sufficient to supply their own increased needs. Some of the largest consumers have reduced production. The difficulty with them is that they have not the raw material, the ores. Copper mines, therefore, seem commercially safe propositions. Investors, however, should not discount the present prices as if they were permanently fixed when it comes to opening mines. An average of quite low grade ore, yielding a small per cent of copper, can be made to pay with copper at the present prices, but any reduction of prices will sweep away small operative profit margins. Treatment costs of low grade ore are the same as the treatment costs of high grade. It takes a definite number of pounds of copper at present prices to pay these charges. With lowered prices it will take proportionally more pounds of the copper. The mine requires a margin in metal content to insure that it shall successfully stand lowered sale prices. A low grade gold mine is distinctly a different proposition from a low grade copper mine. In the former there is only the risk of the mine to be carried by the operator, for the gold is always worth $20.07 an ounce, in the latter he has to carry as well the risk of the market price. The safety margin in the metal content of the mine should be much larger.

A SUGGESTION has been made by a mining engineer that he would contribute liberally to the republication of a number of the special technical papers prepared by experts for the California State Mineralogist Reports. The State should republish them without becoming an object of charity. The papers were prepared in the first instance to be of service to the mining industry. A most convincing tribute to the successful accomplishment of their purpose is the continued demand for them even after they are long out of print. In many instances there were only a small number of copies printed separate from the annual reports, but the supply of the latter has also been exhausted. It is suggested that the technical requirements of the law could be complied with and the papers be republished with credit to the Bureau and advantage to the public. While the original papers are still standard as authority in many lines, the writers would without doubt be willing to bring them down to date at the request of the State Mining Bureau, which could then publish them as new matter. There is no similar set of technical papers published elsewhere, and as official public work the State should not miss the enviable distinction incident on their republication. If the matter of expense stands in the way, their cost could be recovered from their sale.

THE depression in the price of crude oil at the wells in the Bakersfield district in California to 25 cents and less per barrel has done what no end of warning writing on overcapitalization of expectations or danger of outright fraud by promoters could accomplish. It has checked the flotation of oil companies for the money of investors rather than for the oil in the ground, and will hold up some of the needless waste of capital in sinking wells where by no possibility can there be any oil. The condition of unprofitable prices to those who have producing wells is not agreeable, but that is a temporary condition. Profit earning is postponed—that is all. The wells consume nothing when capped tight and meanwhile consumption has an opportunity to catch up with production. The senseless and wasteful speculative exploitation is ended for a longer period than the tie-up of profits. In the enforced rest the companies and investors have an opportunity to take stock, not of paper certificates, but of petroleum, actual and possible, and eliminate some of the unnecessary expenses. The industry as a business will have a better future for the medicine of low sale prices of product that it is taking now.

TWO PRACTICAL TREATISES are very much needed, possibly three. One on mine timbering, the best treatise on this subject, the contribution of Mr. W. H. Storms to the California State Mining Bureau, is out of print. The second one is on mine tunneling or mine adit construction. There are two or three good works on railroad tunnels and large permanent constructions, but nothing on the construction of the smaller mine openings, largely for temporary use. Much material properly part of such a work is published incidental to general mining subjects. If it were all compiled and brought together, so that costs and conditions could be compared, this data would make an excellent textbook for the student and reference work for the mine superintendent and foreman. The third work is one on concentration. Ore dressing to-day is much in advance of the ore dressing of twenty-five years ago. Inventors and the descriptions of sellers of concentrating machinery give much information, but such publications, excellent as they are, are not what the student requires.

NO TITLE can be obtained to Alaska coal lands as such through the failure of Congress to make any provision for township surveys. It provided for the extension of the statutes regulating the obtaining of patents for these lands, but leaves the statute inoperative. It would seem as if the conditions are such in Alaska that the old land office practice of permitting deposits by settlers for a survey should be revived. Restrictions could be attached that would prevent the abuse that grew up in the States through the law. The International Mining Congress at Boise could consider this matter.

Concentrates.

THE commercial source of most of the precious opals is now Australia.

RECENT experiments in wireless telegraphy have made successful transmission 103 and 134 miles.

A TUNNEL 8 feet wide by 7 feet high can frequently be constructed as cheaply as one in the same rock 4 feet wide by 6½ feet high.

DIAMONDS for drilling have increased in value from $7.50 to $70 a carat at the present time, and the price, it is believed, will continue rising.

IRON readily amalgamates in the presence of sodium amalgam. Battery amalgam has been taken out containing as much as 50% of iron.

ONE-SIXTH of an ounce of quicksilver per ton of ore is the ordinary loss to be anticipated. Greater losses will occur with partly refractory ore.

NAILS are so cheap and the value of workmen's time so high that it is unprofitable to straighten a bent nail or to stop work to pick up one dropped.

IN tributing, as it is understood in mining, a mine or a portion of a mine is leased on a return in royalty. It is a good method of working applied to a mine with irregular ore bodies.

THE decomposition of some Portland cements in sea water is said to be due to free lime in the cement, which uniting with sulphates in the sea water made a destructive increase in volume.

IF the percentage of sulphurets in an ore is not more than ten it is preferable to stamp sufficiently fine for amalgamating plates and belt concentrators at once, on the score of economy and simplicity.

THE loss of gold in roasting ores containing tellurium, it is now claimed, is not by volatilization, but by the gold-tellurium compound becoming fluid, sinking through the ore and entering into the furnace bottom.

THE maximum practical speed of stamps with 8-inch drop is about 94 per minute; with a 7-inch drop it is 100, but in actual practice not more than 96 or 97 should be allowed. With a 6-inch drop the maximum number of drops is 110.

A FIELD note book for surveyors is now made with the right-hand page ruled in concentric circles and radii. It is designed for use in stadia surveying, and facilitates the sketching in the field of the points and lines of a topography.

VERD ANTIQUE MARBLE is a mixture of serpentine with limestone, dolomite or magnesite. It is not as hard as marble and takes a high polish. It is used in the arts, but not extensively. The Oriental verd antique is a green porphyry.

COPPER ISLAND is a small sealing island in Bering sea, a Russian possession. It is noted for the amount of float copper and copper ores found on it. There has been no attempt made to exploit the deposits, the island being a sealing reservation of the Russian Cabinet.

IN suits brought against the city of Greater New York for damages due to the pumping of the Brooklyn water supply lowering the ground water level in their adjacent lands, the decisions gave small sums as damages to the complainants, but sustained the right of action.

CRIPPLE CREEK DISTRICT, COLO., has the largest gold production of any single district in the United States. Next to Cripple Creek is the Deadwood district, S. D. The production of the former is almost entirely from high-grade ores; of the latter from low-grade ores.

TUNDRA, referred to in descriptions of Alaska and Siberia, is the descriptive name applied to the low plains bordering the coast or lower courses of the large rivers. These plains, perpetually frozen below the surface, in the summer are swamps covered with mosses and low Arctic bushes and grasses.

THE U. S. Circuit Court at San Francisco, by dismissing the suits against the locators of Cape Nome claims, where the contention was that the locators were not citizens, has again affirmed the rule that the location of a mining claim by aliens cannot be attacked in a suit between private parties.

REINFORCED concrete is a combination of steel or iron and concrete. The metal is imbedded in the concrete so as to give the latter the support of its tensional strength and at the same time utilize the compressive strength of the concrete. The combination practically increases the strength of the concrete a hundred times.

THE strength, weight, proportions, supporting power, speed and power required for a flying machine can all be approximately calculated. The mathematics of flying have been considerably evolved and the subject is within engineering computation. Briefly, what has to be done to fly is now known. There remains to do it.

IN a well regulated stamp mill there should be two water tanks, one always overflowing and furnishing a constant pressure, for the stamp batteries and hydraulic sizers, and a second tank fed by the overflow from the first, which supplies the vanners and other mill uses, where constant head is not necessary for regulation.

THE Russian Government has finally, after three years of consideration, granted the Russo-Chinese bank and its branches the right to buy gold dust direct from the producer. The object is to secure the gold of what are termed free miners, Russian and Chinese who mine without authority and who to avoid confiscation of the gold have heretofore sold it to Chinese buyers who smuggled it out of the country.

THE location of a tract of public land as a petroleum claim, where there is no prior discovery of the oil, does not operate to prevent any one going on the land, drilling for oil, and, finding it by drilling, then locating over the first location. The only safe way to hold an oil location where there is no seepage is to go to drilling on it. No one is likely to chance overcoming the lead of the start of the first drill hole.

THE average cost of diamond drill boring in Victoria, of deep lava-covered placer channels, is from $1.80 to $2.90 a foot. The cost of drilling with the calyx drill in coal-bearing formations, dependent on the hole drilled, from 40 cents to $1.20 a foot. Boring with hand drills in unconsolidated formations, from 40 cents, 100 feet deep, to 85 cents a foot, 350 feet deep. With heavy drift of boulders as much as $1.50 to $1.60 a foot.

THE Nome beach placers are the auriferous stream gravels of an old river channel, probably Anvil creek in this case, brought within reach of sea action by subsidence of the region. It is possible, but not probable, that there has been a recent uplift of the once submerged gravels. Such gold as was found at Nome does not float. It may have been moved by wave action a short distance from its original point of deposit and it is certain that there has been a sea concentration of the original stream formed deposit.

THE sulphide ores of the principal lodes of the Kalgoorlie district in West Australia are composed of a schistose gneiss with a varying proportion of silica and lime, containing tellurides of gold, silver and mercury associated with pyrite. The latter is not rich in gold and the quantity present is not an index of gold value. The tellurides are varying mixtures of several tellurium minerals. The ores vary in some degree from nearly every lode and the differences seem to affect treatment methods, so that no one system has yet been discovered capable of uniform results with all of them.

IN cleaning plates of a stamp battery, a whisk broom cut down, to make it stiff and strong, should be used, and the plate should have every bit of surface brushed hard till the amalgam is loosened. To remove the amalgam, brush from the top of the plate downward to the lower portion and remove the excess of surface amalgam there. A thin coating will remain on the plates as the foundation for further accumulation. Acids should not be used on the plates at all. Cyanide of potassium in weak solution, only with heavy concentrates, and weak lye solution when there is grease on the plates.

A SOURCE of the frequent difference between the average milling returns per ton, operating with a few stamps, and the lowered average returns when a larger stamp plant is used is the lower grade of ore milled. With the few stamps higher grade ore only is milled. With the larger quantity the selecting is not possible, for the quantity of the higher grade is not there. Consequently, everything that is ore going into the mill the average ton return is reduced. The mine is not failing to hold up nor the milling neither. It is simply the working of grades of ore so comparatively poor that they were passed when only the few stamps had to be supplied.

IF, in staking off two adjoining claims on the same ledge, more length of ledge on one or both is included, than will make 1500 linear feet for each claim, so that on remeasuring according to the calls of the location notices the ends of the claims no longer adjoin, the length of lode that was improperly included in the original staking is locatable by any one discovering it. If the assessment work for both of the original claims was performed on one of them on the theory that they were contiguous, and it proves subsequently that they are not contiguous, the one on which no work was performed would seem to be relocatable by third parties discovering that it was not in reality contiguous to the one on which work was done.

LONG-CONTINUED HEATING at a dull red color of low carbon or soft steel, where the percentage of carbon is as low as .2%, causes a granulation or coarse crystallization of the metal. It may become quite brittle. This is probably the cause of some sheet steel for pipes breaking under hammer blows. The rolling and annealing undoubtedly add something to this tendency to crystallization. Sometimes the effects of the rolling and annealing develop what is called scale—an envelope or several envelopes of coarsely crystallized brittle steel over a core of steel of perfect quality. The shells of brittle steel fracture and scale off from bending. Heating to 900° for a short time, cooling rapidly to 630° and then cooling slowly will remove the defect.

THE exhibit of mining made at the Buffalo Exposition under the supervision of Dr. David T. Day of the U. S. Geological Survey has been devised in a system to aid the visitor with the least possible effort to get an intelligent comprehension of the art of mining. First, all the natural mineral substances are shown in specimens just as they come from the earth. Next, the conditions of underground occurrence are shown with illustrations of methods and appliances employed in their removal. Finally the commercial forms the minerals take illustrated by the industries of ore and metal treatment. Specially with the precious metals the physical appearances and forms taken according to the natural source or special form of treatment employed are shown. Maps are distributed showing the mineral-bearing localities, and there are grouped local exhibits. Machines for extracting metals and ores are shown historically. And finally there is a large library of the literature of mining.

THE B. & S. wire gauge referred to in describing electric transmission lines is more intelligently referred to as the American wire gauge. It is not the same as the American gauge for sheet metal, so that the numbers do not refer to diameters equal to the thicknesses of the same numbers in sheet metal. The cross section can be determined approximately for any number of gauge if the cross section of one number is given. The numbers increase as the gauge diminishes. By adding 3 to any gauge number of known cross section area, the resulting number is the gauge number for a wire of half the cross section of the first. Subtracting 3 in the same way gives the gauge number of a wire with twice the cross section. The diameter of a No. 10 B. & S. wire is approximately one-tenth of an inch.

GEOLOGISTS coming up against new phenomena or new views of old phenomena have the habit of coining new words, to take the place of old ones, the rough edges of which have become worn off by use, and which the geologists think do not express their new ideas with sufficient definiteness to be understood among themselves. If it does nothing more than freshen up their speech the new word serves a useful purpose to them. It is of little consequence to the people who use the material they gather what the word is. "Ionization" is the newest word for the idea that has become familiar as "chemical affinity." "Metasomatism" is an even newer expression for the idea that has only recently been appreciated under the term "replacement." It is a point of honor for a geologist to understand the meaning of newly-born technical expressions, he must perforce recognize his own, but the miners would apprehend better if an announcement of the new word was introduced with its exact meaning defined in plain, every-day language. It is embarrassing to admit the ignorance implied in asking for the meaning.

WHERE very exact measurement in a survey is required over rough hill or mountain slopes, two methods are available. The transit can be employed to line in stakes, and tack heads on them so that a tape length can be stretched free between two points. The differences of elevation between successive stakes are then taken with a level. A steel tape compared with a standard is used to measure between the tack-head centers. A spring balance keeps the tension constant. The temperature is recorded. The measured distances between the successive tack centers are corrected for temperature. The base of each triangle is then computed, using the distance between tack centers as the hypothenuse and the level differences as the perpendicular. The sum of the bases finally added gives the horizontal distance between the terminal points. The second method is simpler: The stakes and tacks are centered as before, but sufficiently close together to permit of horizontal measurement being made from a plumb line suspended over the lower point. A tripod with six or seven-foot legs is made and a plumb secured to it. This is set up over the tack centers, successively; a hand reflecting level is used to level the tape to the proper point on plumb line, and the successive horizontal distances are measured, corrected for temperature and added. The latter method will make ordinary mine connections.

UNDER the mining laws of West Australia, any person may mark off as a gold mining lease an area of twenty-four acres, and, after certain preliminaries have been complied with, the Minister of Mines grants the lease, which provides, on the face of it, that the lessee is given the right to all the gold found within its boundaries, being perpendicular, for a term of twenty-one years, with an absolute right of renewal. The main conditions are that the lessee shall not use, or occupy, or permit the said land to be used or occupied for other than bona fide mining purposes, or sites for offices, or dwellings for the persons employed in or about the mine; that an annual rent of £1 ($5) per acre shall be paid to the Crown, and that one man for every six acres shall be employed in the construction of the works, or in mining operations on or under the said land during the usual hours of labor, being eight hours on every working day (not being a Bank holiday), except Saturday, when only four hours' work need be done, and except during such period of exemption from work as the Minister or Warden may grant. The holder of a gold mining lease is entitled at any time to exemption from labor on the property for one month on satisfying the Warden (who has power to grant that period) by evidence on oath in open court of the actual existence of any of the following causes in reference to the land: Want of capital after a fair sum shall have been expended. That time is required for erection of machinery. The influx or scarcity of water. Scarcity of labor. The collapse of a working shaft. That the mine is for some other cause unworkable. That the owner or owners require to be absent for some sufficient reason from the locality, or is or are unable, by reason of sickness or other sufficient cause, to work the mine. That the title to the mine is in dispute. That the owners of two or more adjacent leases desire to concentrate the labor compulsory on such leases on one of such leases, and to obtain suspension of labor for the other leases.

Auriferous Iron Sands of New Zealand.*

Auriferous iron sands (chiefly magnetic oxide) are, for the most part, confined to the west, south and southeast coasts of the middle island of New Zealand, commonly known as the south island.

The titanic iron sands of the west coast of the north island, though mixed with magnetite, are not usually gold-bearing, and south of Auckland have not been ascertained to contain gold in sufficient quantity to pay for working such deposits. For the most part these sands have been derived from volcanic rocks of young Tertiary date, associated with which, except on the western flanks of Mount Egmont, there are no lodes carrying gold.

On the west coast of the south island the sea beaches, formed of material of moderate fineness of grain for the most part, show the presence of magnetic iron sands, and often such sands for a considerable part of the total material of the beach between high and low water mark. Such sands are at almost all places auriferous, and for the past thirty years have been worked for gold. At first these deposits were extremely rich, and were worked again and again, as often as the material was acted upon by a heavy surf during storms, or rearranged more slowly by the ordinary action of the tides. Often the auriferous sands would be covered by a variable depth of grey quartz sand, which, if not too deep, would be removed to reach the auriferous layer, but as frequently this would appear at the surface, varying from a few inches or a mere skimming to 1 foot or more in thickness. Such deposits, when formed, were treated as rapidly as possible, or, at all events, removed beyond the action of the tide, as they are apt to be suddenly swept away by a change in the direction of the wind or by a varying force or direction of the tide and sea currents. Gradually, in the course of years, these beach deposits became less auriferous.

Usually, where magnetic iron sands are found on the beach, deposits of the same kind, now no longer acted upon by the tide, are present on the higher grounds inland, or lie buried under grey sands between tide mark and the foot of the first terrace. These beach leads have been a great source of gold at many parts on the west coast of the south island. At many places, near the mouths of rivers and large creeks, considerable areas have yet to be worked. This first horizon above or inland of tide mark has deposits of iron sand in all favorable situations along the west and south coasts of the island, and these are notably developed near the mouths of the larger rivers. Usually they have proved very rich in gold, and but for difficulties such as have been alluded to most of them had already been worked out. At higher levels successive terraces of auriferous iron sands are met with.

On Addison's Flat and at Charleston the iron sand deposits are developed on a most extensive scale, and have yielded—and still do—great quantities of gold. At both places further oxidation of the magnetite has taken place, and rusty-colored iron sand cements are the result. This fact has entailed an enormous loss of gold to the claim holders working the cement, as the gold coated with iron oxide escapes being caught by the means employed for that purpose, and, finding its way into the tailing channels and streams, a part of such escaped gold is again recovered by various contrivances placed so as to intercept it, and a part carried to the seaboard tends to enrich the black sand deposits within tide mark. Between Charleston and Brighton these deposits rise to a height of 600 feet above the sea.

The great richness in gold of these sands enabled them to be worked with profit when the means employed were both costly and of a rude description. At many places the yield was phenomenal, and black sand claims are still in favor. Many deposits are rich only in particular parts, or are poor generally.

The auriferous iron sands of the west coast comprise the black sand beaches at low levels along the present coast line. Generally they are limited to a terrace escarpment of the more elevated lands on the inward side, which runs nearly parallel to the coast line, but near the mouths of the larger rivers they recede inland and become less marked, and here the deposits of the littoral zone blend with those brought down by the rivers.

By the continued action of the surf the heavier materials—gold and black sand—are associated together, and there, between high and low water mark, accumulate to what appears as a stratum of black sand, which, varying in thickness, may be either exposed at the surface or buried under a variable thickness of ordinary grey sand. The gold usually is very fine, and special means for saving and collecting the same had to be devised. Between the sand hills and foot of the terrace escarpment, where present, there is usually a swampy depression, on the inland edge of which, so far as it could be worked seawards, gold under similar conditions to that on the beach and under the sand hills has occurred, but the water at present prevents this being further worked without the application of special dredging and pumping appliances.

Along the different lines that have been worked these deposits are usually spoken of as "black sand leads," but to me the term is misleading, as I am well satisfied that a more or less continuous stratum of gold-bearing sand will be found from the foot of the cliffs to the present beach, or, where these are absent, from the point where the fluviatile deposits of the rivers give place to the deposits of the littoral zone.

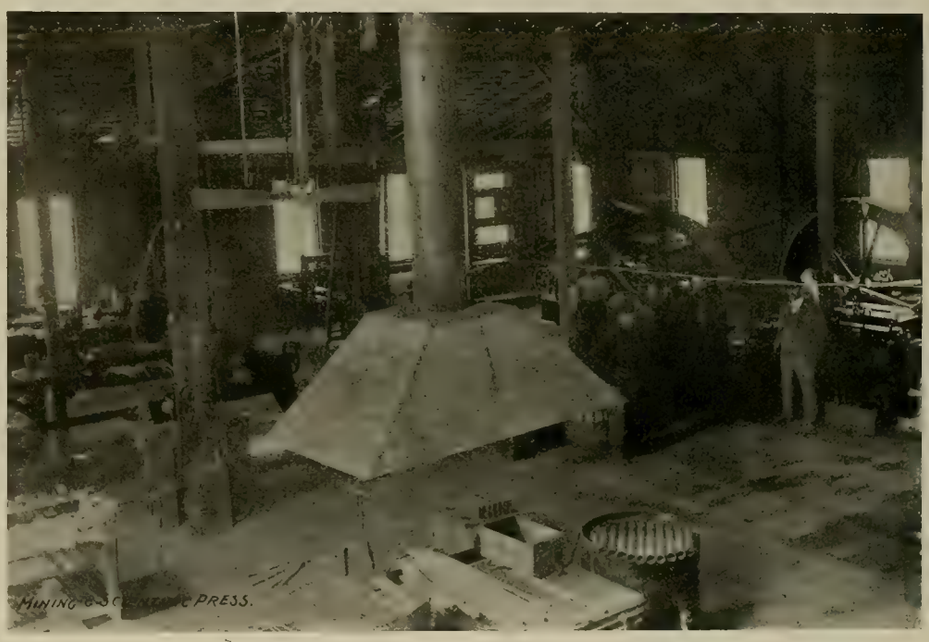
The source of the black sand gold within high water mark, and the lower black sand leads parallel thereto, is supposed to be mainly the fine gold carried along the beds of the larger rivers and distributed to the different beaches by the action of the sea. That gold in this manner does reach the coast line, and is so distributed, is not to be doubted, and as an instance in illustration the Arahura river may be cited, the beaches of which for the first 10 miles up the valley were rich in gold. The New river also is proof of the same thing. However, in the one case—to wit, the Arahura—the gold may have been directly derived from the rocks in situ. In the other case, that of the New river, it has been derived from preexisting auriferous gravels. But, apart from such considerations, to refer the whole of the beach gold to the golden sands carried along the beds of the rivers to the sea implies a greater richness of these than seems to be borne out by the facts. It is more probable that much of the gold found must be referred to the sea cutting away and reassorting older deposits of the more elevated black sand leads, and the auriferous gravels of older Pliocene or Miocene date. Where the high-level marine gravels are absent—as, for instance, between the mouths of the Hokitika and Totara rivers—and glacier deposits are present, to these latter must be referred no inconsiderable part of the gold found on the black sand beaches.

Like the littoral deposits already described, marine gravels containing black sand leads are developed parallel or approximately parallel, to the coast line. They are first distinctly met with at the eastern edge of the Big Paddock in the Houhou lead, at the bottom of the serias of gravels forming the terrace flat to the westward.

On Ballarat hill the lead was fully developed. As far back as workings have been carried to the eastward, on Ballarat hill, beds of black sand, partly oxidized and cemented, are found interbedded with the coarser gravels, thus indicating the marine character of the beds.

*Condensed from ALEXANDER MCKAY, F. G. R., Government Geologist, in New Zealand Mines Record.

Hoisting Works of Morning Star Shaft, Three Stars Mine, Ophir, Placer Co., Cal.



Machine Shop of Three Stars Mine, Ophir, Placer Co., Cal.

(See front page.)

ELECTRIC EYEGLASSES, a German invention, are claimed to restore dimmed or darkened vision. They are about the same size as an ordinary pair of spectacles, but the frame is made of thin layers of copper and zinc. These metal sides are moistened with some dilute acid, and an electric current is thus caused to flow through the eye nerves, resulting in better vision.

THE total domestic exports of the United States in the nine months ending with March were $1,120,480,673, while the exportation of British and Irish produce in the same period was $1,060,346,214, showing the exports of the United States to be $60,000,000 greater than those of the United Kingdom for the same period.

Electricity in Mountain Mines.*

By F. W. Brady.

The first requirement in making such mining installations is to get reliable data of the capacity of the water power. Generally the plants installed far exceed the power available to drive them. The report of the constructing engineer should be very elaborate, not only regarding the water power, but also conditions in the mine, the methods of transportation, special requirements in design of apparatus, maximum weight of parts and dimensions, the topography of the district for pipe lines, transmission lines, etc. As mountain streams are so variable, it requires measurements for a period of several years to get any reliable basis to work on. From the very nature of the case, such installations are far from the base of supplies and in locations often where little or no mechanical or electrical work had ever been previously attempted. Even at best, an unlimited number of schemes and devices must be worked out on the spot to facilitate the transportation, construction and operation of the plant.

The plant of the American Nettie gold mine, of Ouray, Colo., is a good sample of an installation in which all the mine machinery and most of the materials for the transmission line were transported from the railway over a burro trail. The source of power for the plant is the Uncompahgre river, a dashing mountain stream fed by springs and heavy snows from a very large area of an intensely rugged range. There is a considerable variation in the volume of the flow of the stream, the lowest being in February and March, when there is the least thaw and the streams are frozen. The flow at this time was found to be 960 cubic feet per minute. The river also has a daily variation, being lowest about 3 o'clock A. M., and highest in the evening. The flow is also cut off temporarily at times by big snow slides which close the stream until it can melt through.

The highest water is in early July, when the first hot days in this region bring down all the snow from the immediate foothills. No measure was secured of this flood stage. A 30-foot log dam, a penstock 18 feet high by 6 feet square, and 400 feet of 4x5-foot flume with sand box and screens were erected in the winter during the lowest stage of water. Ten feet of the penstock was built of 2x6-inch plank laid flatwise in tar and spiked together; upper 8 feet of 2x4-inch. Four 1-inch anchor bolts extended through the entire height. The pipe line was 1400 feet long and 30 inches in diameter and made of No. 14 B. & S. steel. These plates as received were 36x96 inches, and weighed from sixty-five to seventy pounds each. These were punched, rolled and riveted and six sheets put together, the horizontal seams being double, and the vertical ones single riveted and making sections 17½ feet long. These sections were then dipped in a hot bath of maltha and coal tar and thoroughly coated inside and out. Ten barrels of the compound were required for the job. After drying they were hauled to the grade and put together as follows: beginning at the wheel end the sections were united by a 6-inch telescope joint. The larger ends of the sections were expanded by sprinkling with gasoline oil and firing. This process also softened the compound and aided in making a tight joint. The sections were forced together by using a set of triple blocks on each side, having two men operating each set of blocks and a fifth man to guide the end of the pipe and at the same time jar it to a tight fit by using a sledge against a block of wood on the end of the pipe. As line was straight, and the fall not over 75 feet, this style of joint proved very effective. The wheel opening being 24 inches, a reducing section was necessary at this end. A 14-inch manhole and a hose connection was also placed in this section. The connection at the penstock was enlarged from 30 to 36 inches to allow an easy entrance for the water.

A 3-inch air valve was inserted in the pipe on the highest vertical bend. Most of the pipe was laid on an elevated grade. It crossed the stream from which the water was taken, and required two special bridges for this transfer. Practically the whole of the pipe was therefore subject to the extreme changes of temperature. Such a pipe should be kept full of water to prevent undue expansion and contraction. If not, there will be excessive leakage.

The building erected to house the machinery was a two-story frame structure 30x32 feet, the second story being used as a residence for the operator. The plan was made to accommodate duplicate generators to be operated by a 20-inch double-discharge Leffel turbine with horizontal shaft and friction-clutch pulleys, 28 inches diameter by 13 inches face, one for each unit. The turbine with its two 12-inch by 4-foot draft tubes was set on foundations as directed by the makers.

The foundations for machinery and building were made of rock and cement. However, the "I" beams composing the longitudinal part of the frame were deflected sidewise by the water pressure, and it became necessary to bring them into line again by the use of jackscrews, and then to extend the concrete foundations to the top of the beams. The wheel was fitted with a Wood governor, which worked very well for small variations of load; but for large ones like that caused by the starting of a compressor, it was of no value in this plant. When such changes were to be made, the operator was notified by telephone, and hand regulation was applied to the wheel. Without this hand regulation, the incandescent lights would be destroyed when a heavy load was thrown off. The plant was operated continuously.

The switchboard was made of kiln-dried maple, and arranged for the duplicate 60 K. W. 500-volt compound generators.

The line extended over a very rough section of country, and was rather difficult both to locate and to construct. There were several zigzags so as to cross the cliffs where it was possible for men to approach the route. Trees were used for poles wherever possible. Other poles were cut from the nearest timber, and rolled or dragged into position, and set in holes blasted from the rocks by the use of dynamite. Heavy guys and double crossarms were frequently used along the line. The wire, 000 B. & S. bare copper, was received on wooden spools in the lengths of 1000 feet (500 pounds). It was desired to take about one-third of these coils to the mine and run them out from that end. As 500 pounds was too heavy for one mule to carry, and as it was preferable not to cut the wire, they were transported as follows: The wooden spools were removed from the wire, and the coils separated into four parts with connecting links. Two of these were placed on the pack saddle of one mule, one on each side, so as to balance. The other two were similarly placed on a second mule, the animals being connected by the 10 or 15 feet of wire between the two loads. The outfit could then move single file up the trail. At the mine the four sections were placed on the spools, which served as reels when placed on a spindle anchored to a tree. The end of the wire was passed through a friction clutch made of two pieces of plank bolted together, and then guided down the route of the poles by several men. A second section was then spliced and soldered to the first, and the operation continued until 3000 feet of wire was drawn out, 1500 feet on each side. Other sections were then drawn out by men and horses from various locations along the route, which could be most easily reached, for the total length of 4400 feet. The completed joints were made Western Union style and soldered by pouring the molten solder over them. The wire was laid up and drawn into position in the usual manner. Special railway insulators were used to anchor the wire on the tops of high bluffs. Care should be taken in such rough country to set the cross-arms on the poles so that the grooves of the insulators will be in line with the wire, also that such construction be made extra good and strong.

The mine consisted of a series of tunnels opening in the face of quartzite ledges on the mountain side at an elevation of about 9500 feet. These tunnels were of irregular size, varying from that of a rectangle less than 4x6 inches to very large rooms or cavities. The mine was practically dry, though some water accumulated in two or three places.

The mine equipment besides incandescent lights in the tunnels and buildings was as follows: one 12x12 inch high altitude type of compressor, a blower, and a hoist. The machines were housed in good sized rooms made of boards and corrugated iron. It is necessary to cover such machines with a tight and strong roof to prevent small pieces of rock from dropping into the working parts. A substantial room for each machine is advisable, which can be locked to prevent meddling by employes other than the ones directly in charge.

The compressor was set in an offset from the main tunnel about 1000 feet from the entrance, and near the work to be done. This method of location is important, as it saves power, cost of installation, and avoids loss by leakage of pipes. No. 0 B. & S. insulated wire was used in this tunnel. The compressor was operated by a 35 K. W. shunt motor geared on the same bed plate. The air receiver, 30 inches in diameter by 10 feet, was located about 20 feet from the compressor. The jackets of the air cylinders and the intercooler were supplied with water from two 735-gallon tanks located about 100 feet from the compressor. A centrifugal pump was driven by belt from the intermediate shaft of the machine, and forced the circulation of the water through suitable piping. From ten to eighteen gallons of water per minute were passed through the compressor, and kept it in fair condition. The speed of the compressor varied from 150 to 200 revolutions per minute, and when operating two Ingersoll-Sargent drills and furnishing blast for one forge at a pressure from sixty to eighty pounds, the motor required from sixty-five to eighty amperes at 450 to 475 volts.

The blower was located about 200 feet in the tunnel in the "Y" formed by a branch. A 15-inch galvanized iron pipe extended from the blower to near the head workings. The blower was operated by a 6 K. W. shunt motor arranged with a reversing switch so that the smoke could be exhausted directly from the head of the mine without scattering it through the other tunnels. Also by this method fresh air could be sent directly to the miners, and the work carried on with the least interruption possible. The blower required seven to ten amperes at 475 volts.

The hoist was set up in a branch from the extreme inner end of the main tunnel some 300 feet from the compressor, and was operated by a 25 K. W. series street car motor controlled in the same manner. It was arranged with a drum for 600 feet of ⅞-inch wire rope in one layer. The shop test of the motor showed 1300 pounds raised 600 feet per minute. The normal load was 700 pounds at 600 feet per minute.

The wire in the tunnels was of heavy weather proof insulation tied to heavy porcelain insulators bolted to wooden pins which were driven into holes drilled in the quartzite roof and walls. The location of the holes for the insulator supports so as to have the wire clear all obstructions, was done by two men, each with a lighted candle. By holding a candle at one pin and the other a few feet ahead at such points as allowed the lights to be seen by both men, the proper places for the pins were rapidly located. There was a heavy condensation of moisture on the insulators and wire. This was effectively prevented by coating them with P. & B. paint.

One of the greatest troubles experienced in the operation of high altitude electrical plants is from lightning. Electrical storms are of very frequent occurrence, heavy discharges from the lines occurring sometimes during clear weather. The arresters used on this plant were of the General Electric Co. magnetic blow-out type. Four were placed at the mine, and two at the station. As the mine was a dry one, it was difficult to get a suitable ground at that end. A good sized basin was blasted out of the quartzite near the mouth of the tunnel, and this was filled with charcoal, and the arresters grounded to a copper plate placed in it. The basin was kept damp by water occasionally thrown in it.

The transportation of the station materials and machinery was done by wagons in the usual manner. But that for the mine had to be taken over a very steep, crooked and more or less dangerous trail. All apparatus had to be entirely dismantled. The small parts and attachments were packed in ore sacks and carried on burros. The next larger sizes, such as bearings, small gears, pulleys, etc., were wrapped in sacks and loaded on mules. All pieces too heavy for mules or of such shapes that they could not be balanced on pack saddles, were moved on sleds. These sleds were made of 2x4-inch pine, from 3 to 8 feet long, and having a width of 20 inches. A sled was used for each of the pieces such as armatures, fields, pole pieces, sections of bed plates, gears, cylinders, air receiver, etc., etc. Some of these pieces required the use of four horses in tandem to move them on the trail. In passing the zigzags, blocks and ropes with two horses pulling down hill, was found to be the most secure and rapid method. Several of the parts of the equipment required the use of four horses, three men and a good supply of tackle, crowbars, etc., about five days to move each one to the the mine from the railway station, a distance of about 2½ miles. Only a few pieces received scratches and bruises, and only one piece jumped the trail, and this fortunately did not receive serious damage.

A rough test was made of the station. While not strictly accurate, it may be of some value in planning such installations.

When the output of the generator was eighty-five amperes at 575 volts, the average velocity of the water in the tail race was 188 feet per minute. The tail race, 6 feet 7½ inches wide by 4 feet deep by 150 feet long, was made of planks and had a fall of $\frac{3}{16}$ inch per foot. The water velocity as given was obtained by counting the time for light floats to travel about three-quarters of the length of the race. These floats were placed in the middle, and in various parts of the surface of the stream. The depth of water for this load was from 9¾ to 10 inches.

The approximate cubic feet per minute was then as follows:

$$\frac{79\frac{1}{2} \times 10 \times 188}{144} = 1033.$$

Elevation of standing water in the penstock 103 feet above datum.

Elevation of standing water in the lower end of draft tubes 26.2 feet.

Total head = 103 − 26.2 = 76.8 feet.

Friction loss in 30-inch pipe for 1037 cubic feet per minute = 4.3 feet.

Effective head = 76.8 − 4.3 = 72.5 feet.

$$\text{H. P. of water} = \frac{1033 \times 62\frac{1}{2} \times 72.5}{1033} = 142.$$

$$\text{Electrical H. P. output} = \frac{85 \times 575}{746} = 65.5.$$

Velocity of water in tail race for friction of station plus 40 − 20 C. P. 3.6 watt lamps was 88.8 feet per minute, the depth 4 inches = 19.6 cubic feet per minute.

H. P. of water for friction plus the 40 lamps =

$$\frac{19.6 \times 72\frac{1}{2} \times 62\frac{1}{2}}{330{,}000} = 26.9.$$

* Trans. Am. Inst. Elec. Eng., April, 1901.

Prof. J. J. Thompson regards the chemical atom as made up of a large number of similar bodies, which he calls "corpuscles." His theory has been adopted by many scientists.

Summit County, Utah, Mines.

[STAFF CORRESPONDENCE.]

The Daly-West mine at Park City is producing 250 to 300 tons of ore per day, which is a considerable increase over that of last month. Of this, about 170 tons are milling ore, the balance first grade or smelting ore. In March, 1900, the writer gave in the MINING AND SCIENTIFIC PRESS a careful description of the underground workings and ore bodies in this mine, and how its ores were handled through the Ontario-Daly and Daly-West ore tunnel, which strikes the Daly-West shaft at the 900-foot level. A trip underground there to-day discloses much the same conditions as were described previously, except that the ore body, which runs northwest and southeast, has been opened at various new points and more extensively exposed; also that a 100-foot winze has been sunk below the 1400-foot level, all the way in ore. On the 900-foot level a crosscut is being run to cut the ore at a nearer point by reason of a turn made in its trend. The bulk of the ore on this level comes from a section about 3000 feet from the shaft. One of the most interesting pieces of work in this mine is to be seen on what may be called the "blind seventh," which is entered by a shaft and ladderway that run 180 feet vertically from the ninth level upword. Here is opened what is proving to be an extensive body of silver-lead carbonate, carrying also some copper and gold. The ledge lies in a nearly horizontal position in most places and seems to have been cut off from that on the ninth by a great roll of lime and porphyry. One of the chambers stoped out is seven sets wide and five sets high, a face of ore of those dimensions appearing on the side in the direction of which the work is proceeding. The large tonnage being shipped from this blind level is dumped through chutes to the ninth level, where there is car trackage to the shaft and ore tunnel. The mine work is superintended by John A. Kirby, who was formerly superintendent of the Bullion-Beck at Eureka, Utah. The mine foreman is John McSorlie, who opened the mine and demonstrated its value a number of years ago, since which time he has been continuously connected with the property.

One of the interesting features of the Daly-West property is the concentrating mill, of which F. W. Sherman is superintendent. He has made some experiments which may be of interest elsewhere. In general, the mill is provided with crushers, wet screens, jigs, hydraulic settlers and concentrating tables. About 50% of the values are saved in the jig product. Jig No. 1 is supplied by the oversize from a 3-mesh screen, the oversize from a 4-mesh screen going to No. 2 jig. The tailings from these two jigs pass to two Huntington grinders. The material that fails to pass a 6-mesh screen goes to No. 3 jig, that which is an oversize from an 8-mesh screen passing to No. 4 jig. The tailings from jigs Nos. 3 and 4 pass direct to a specially made Wilfley table, gauged for coarse concentration, which produces a middling that is returned to a Huntington for regrinding. Nos. 5 and 6 jigs are supplied by the undersize from an 8-mesh screen, the slime water being separated from the product before it goes to the jig. The tailings from jigs Nos. 5 and 6 go to Wilfley tables for reconcentration. This being an unsized product, a 5-foot width of middlings are caught and carried to a second table for a third concentration. The product that passes through the Huntingtons, after the slime water has been drawn off, is distributed to five Wilfley tables, where concentrate and middling products are made, the latter being reconcentrated on other sets of tables. Thus four grades of middlings are made, each of which is reconcentrated. The slimes are carried to a preliminary settling tank, so constructed that the slime water gets a run of 500 feet back and forth in the tank, which effects a sizing of the slimes. The water is then drawn off, leaving the pulp, which is dropped to four hanging tanks below, which supply material to that number of tables. A certain grade of pulp is made for each tank by gravity sizing. The overflow of water from the preliminary tank supplies the jigs with water. Any excess of slime water passes to the waste gate through twelve hanging tanks, each 4x4x10 feet. The pulp caught here will, 90% of it, pass a 200-mesh screen. Mr. Sherman estimates that in this mill 45% of the values stops on a 30-mesh screen, 27% stops on a 100-mesh screen, 9% on a 200-mesh screen, and that 19% of the value passes a 200-mesh screen. That which passes the 200-mesh will run 5% lead. In handling at present 170 tons of ore daily in this mill a volume of water equal to only eighty gallons per minute is used.

The Ontario mine is hoisting about 100 tons of ore per day, all of which is now shipped to the smelter. Ontario ores are quite siliceous and carry some copper as well as silver, making an ore in demand at the smelters, and it is said an offer was made by the smelting company that was deemed advantageous to the Ontario mine. The old Marsac mill, which includes stamps, driers, roasters and the Russell leaching process, will now operate on tailings which accumulated a number of years ago at the old Ontario mill. The latter mill was one of pan amalgamation, chloridizing and roasting, and the tailings which are to be treated at the Marsac are said to run ten ounces silver.

Within the last few months the Ontario shaft has been sunk from the 1500 to the 1700-foot level, and a crosscut is being driven from the bottom of the shaft to the ore body. This 200 feet additional depth vertically is equivalent to about 300 feet or over of depth on the incline of the vein. The fifteenth level, which is the lowest one on which the ore has been opened, shows a better grade of carbonate and sulphide ore than was found on the level next above it. A 3000-gallon per minute pump has been put in to handle any possible surfeit of water that may come in on the 1700 level, as that is 200 feet below the level of the Ontario drain tunnel.

It is learned at the sampler that about 8000 tons per month of crude ore and concentrates are being shipped from Park City. The concentrates comprise about one-third of this tonnage.

C. N. Loring is operating a concentrator in the gulch below Silver King, on an old hand-jigging dump, which was made before the erection of the present Silver King mill. He handles about 1200 tons per month.

Marcus Barnes also runs a series of jigs and concentrators on the final tailings that pass down the gulches below the Daly-West and Silver King mills.

The Anchor mill makes a heavy jig product, the tailings therefrom making two or three grades of table concentrate. The ores here are rather low grade as to silver and lead, and carry from 16% to 20% zinc in an iron gangue, which is not saved. By the addition of other tables an effort will be made to handle the tailings which run so heavy in zinc and iron. This mill receives practically the entire product of the Anchor mine, which amounts to about 100 tons per day.

The Quincy mine, which has a hoist and compressor over a 400-foot shaft, is creating much interest in Park City district because of the good body of high-grade silver-lead carbonate ore that has been opened therein. In the fore part of last winter a considerable tonnage was shipped from the property, which is reported to have run about $90 per ton. Shipments are now to be resumed on the completion of a wagon road. The property is close to the Daly-West, but higher up the hill than the latter.

Park City, Utah, May 15.

The Use of Tamping in Blasting.

TO THE EDITOR:—In your issue of the 4th inst. appears a communication signed by R. H. Bemis on "Tamping in Blasting," the writer of which asserts "that not one valid reason can be advanced why dynamite should be tamped."

This statement is correct if the holes are already full of water, or if they are to be fired simultaneously with a battery: and happen to be all "down holes." One or two shots can be fired with ordinary tape fuse without tamping; but in blasting a "round" of machine holes the common way, and "spitting" the fuse, if no tamping were to be used there would be far more chance that many of the holes would miss, as the concussion of the first exploding holes is almost certain to jar or tear out the primers and fuse in some of the yet unexploded ones unless there was tamping to hold each primer in its place. This is the principal reason why tamping is employed.

The fact that all nitro-glycerine compounds, known as dynamite—Giant, Hercules, Judson, Vigorit and other powders of this class—will blast just as well without tamping as with it, is well understood by every practical miner of intelligence, and is universally acted upon in hydraulic work; the large boulders exposed in piping are "bulldozed" by simply laying the powder loosely on top of the rock to be removed, covering it with a few shovelfuls of earth, and exploding the charge with a capped fuse.

I have some curiosity to know how a round of holes can be loaded and blasted in a steeply inclined or perfectly vertical upraise without using tamping.

Now as to filling up the hole with a rag. Some miners use old sacks, pieces of rope or rags to tamp with; they usually discontinue it after a time, and sometimes quite suddenly, if working in a large mine where the foreman is "onto his job," for there is nothing much worse than the smell of burnt or exploded rags in the usually close atmosphere of a mine.

If all the men working in the drifts and stopes of a large mine made a practice of using rags for tamping the mine would soon run short handed and the company doctor would have his hands full of sick miners.

If all miners were made to sift their tamping through a coarse screen before using and were always provided with the best triple-taped fuse, and good cap crimpers, missed shots would be of rare occurrence. A good enough screen for tamping can be made by punching the bottom of a pan full of holes with a round 20d nail. Tamping grabbed up at random and stuffed into the drill hole is the cause of many missed shots, as a large piece of hard quartz is almost certain to cut the fuse and the slightest moisture will then gain access to its interior. If tamping is screened fine there will be little chance of breaking or cutting the fuse. This seems a small matter but it is the details that are to be studied.

Big Oak Flat, Cal., May 16. C. L. L.

Jeffrey Century Belt Conveyor for Handling Ore.

The accompanying illustrations show a system of the Jeffrey Century belt conveyors furnished the Arminius Chemical Co. of Mineral, Virginia, by the manufacturers—The Jeffrey Mfg. Co., Columbus, Ohio.

Fig. No. 1 shows a special conveyor used in connection with the jig washer. This conveyor has special carriers which are adjustable so that the belt can be made concave or convex to suit the condition of the material so as to allow the water to drain off. This special conveyor delivers the ore upon the storage conveyor, which is about 200 feet long, more fully shown in Fig. No. 2. The storage conveyor is provided with a traveling tripper, which delivers the material at any point and at either side along the run.

The Century belt used in this conveyor is manufactured especially for this work, its carrying sides being re-enforced with an extra thickness of rubber of such a composition as will best resist wear and tear, while it is supported on special iron troughing carriers, which are self-oiling, one oiling lasting for months.

FIG. 1.

FIG. 2.

Economic Values Below Cities.

When we have long become accustomed to a thing, we are apt to settle down to it with an "always was, is now, and ever shall be" sort of sentiment till we are wakened up, it may be by a wide awake progressive man of science, or by some scientific man who knows how to apply his science. Take some large city we have lived in from our father's time which has existed many years, perhaps for generations. We have never thought about that city being underlaid with valuable coal, oil or gas at available depths—never bothered ourselves with the idea; no one ever sug-

gested it although we all knew that coal or oil existed and was developed in the surrounding country. Some geologist comes along and with little respect for houses, streets, and city conventionalities, regards the city as a geological problem and forthwith declares that from careful observations made in the neighborhood, or from his own geological knowledge, the results of experience, he is convinced that the city is underlaid by coal, or it may be oil or gas.

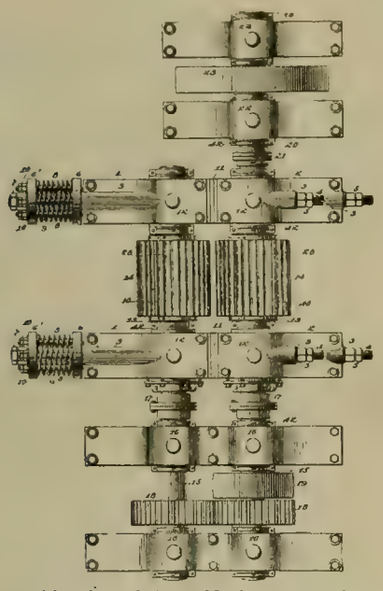
As a case in point look at the discoveries of oil underneath Los Angeles, California. Little did the earlier inhabitants and real estate men, when they laid out their parks and erected their beautiful houses in that beautiful city, imagine that in a short time their grass plots and parks would be invaded by a forest of oil derricks, and the finest residence portion of the city be reeking with the odor of oil, as the result of the enterprise of one or two citizens. From an æsthetic point of view it might have been wished that that beautiful city had been spared such a discovery within its limits and that oil had been found farther from it.—Mines and Minerals, Scranton, Pa.

Mining and Metallurgical Patents.

Patents Issued May 14, 1901.

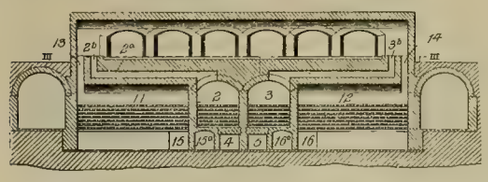
Specially Prepared for the MINING AND SCIENTIFIC PRESS

GRINDING OR CRUSHING ROLLS.—No. 674,057; T. A. Edison, Llewellyn Park, N. J.



The combination of two side frames, each made in two parts with essentially parallel abutting edges, connecting bolts passing through sleeves cast integrally with the sections of side frames to permit relative movement of sections, a compression plate connected to one section of each side of frame, a second compression plate connected to connecting bolts on each side, compression springs between plates tending by elasticity to hold sections of each side frame together, two shafts carried in bearings in corresponding sections of side frames, grinding or crushing rolls carried by shafts, two driving shafts mounted with shafts of rolls but in stationary bearings, gearing between driving shafts, and wabbling connections between driving shafts and corresponding shafts of grinding or crushing rolls.

FURNACE.—No. 674,079; F. Danner, Springdale, Pa.

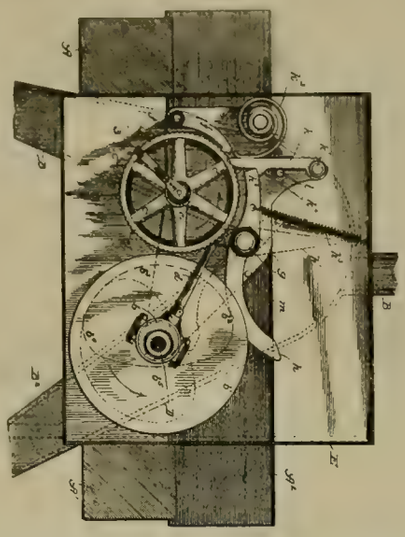


A heating or melting chamber, two gas regenerating chambers, two pairs air regenerating chambers arranged on opposite sides of gas chambers, regenerating chambers being connected to heating chamber, flues extending under gas chambers and having opposite ends connected respectively to gas conduit and stack conduit, valves controlling flow of gas to and from flues, flues extending from air regenerating chambers to stack conduit, and provided with air inlet ports intermediate of stack conduit and regenerating chambers, and valves controlling flow of air to and of gases from flues.

PROCESS OF MAKING LEAD OXIDE.—No. 674,031; A. G. Fell, New York, N. Y.

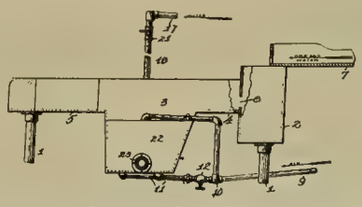
Process of treating lead ore or similar lead compounds, which consists in first converting lead into a lead salt decomposable with alkali, then treating mass with alkali to convert lead into oxide, then dissolving out soluble salts of alkali, then heating residue containing lead oxide with solution of alkali to dissolve lead oxide, and then cooling solution to allow the oxide to crystallize out.

SAMPLER.—No. 674,095; G. A. Overstrom, Anaconda, Mont.



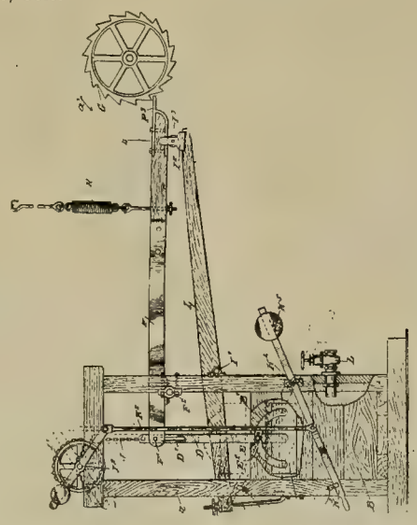
A chute, branch main and sample chutes communicating therewith, a deflector separating branch chutes and normally located to direct material to main branch chute, a rock arm fixed to shaft, a main shaft provided with a cam for actuating rock arm, a latch serving to hold rock arm normally elevated, a rotating member provided with means for intermittently disengaging latch to permit movement of rock arm, and connecting means between main shaft and rotating member for imparting movement to latter.

ORE CLASSIFIER.—No. 674,169; J. Klein, Desloge, Mo.



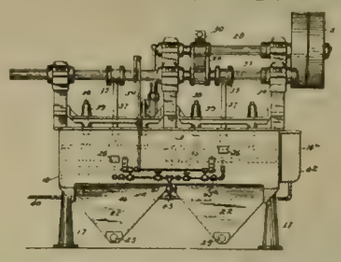
A chamber or hopper adapted to receive mixture containing ore and sides and bottom of which are integral, rendering it devoid of cracks or joints at corners, and having openings through sides to permit passage of ore, classified ore chambers at sides of chamber or hopper to receive ore which passes through openings, air pipes leading through sides and bottom of hopper, and water pipes leading into chamber or hopper and directed towards openings in sides, so that, when water is admitted through pipes, ore will be driven through openings into classified ore chambers.

CONCENTRATING JIG.—No. 674,214; S. Orr, Leadville, Colo.



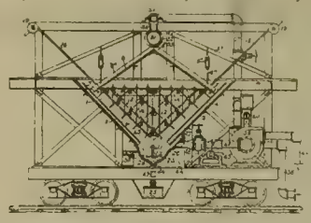
A water tank, a jig pan having perforated bottom, held submerged in water in tank, slotted links connected with pan, a jig beam provided at one end with means for engaging slots in links and fulcrumed near end, a toothed wheel engaging longer member of jig beam at free end to impart downward movement, and means for swinging beam upward when released from toothed wheel.

JIG.—No. 674,269; J. Klein, Desloge, Mo.



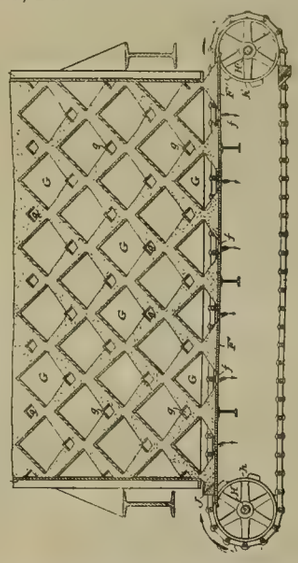
A screen compartment, a plunger compartment to contain water, a hollow air-charged plunger having sloping top within plunger compartment, guides for plunger, and means for operating plunger.

AMALGAMATING AND CONCENTRATING APPARATUS.—No. 674,299; J. H. Lancaster, New York, N. Y.



Tank having lower discharge, of number of alternating, horizontally separated, triangularly arranged amalgamating plates, uniformly disposed throughout tank interior as to present at the top, in same horizontal plane, inlets of several vertical tortuous passages, together with top feed and means for continuously circulating material and water simultaneously downward through passages to and through discharge.

ORE COOLING DEVICE.—No. 674,354; F. C. Durant, Philadelphia, Pa.



An ore chamber having bottom spaced from walls and provided with discharge openings, series of sheds in chamber, sheds of one series alternating with those of next series to subdivide the ore and form air conduits, walls of chamber having air inlets at ends of several sheds and sheds of lower series extending over discharge openings, with discharge device traveling across bottom, and comprising endless chains exterior to chamber, and a scraper having inwardly curved ends and connected at ends to chains, and means for actuating chains.

PROCESS OF REDUCING METALLIC SULPHIDES.—No. 673,974; L. M. Bullier, Paris, France.

Process of reducing compounds containing sulphur, which consists in heating compounds to high temperature and to fluidity and acting upon same, while fluid, with calcium carbide, thereby causing calcium carbide to react upon compounds and to effect reduction.

NEW YORK is about to pass a law to tax mortgages and other securities by means of stamps. A stamp representing the annual tax must be affixed to the document and cancelled in order to make the instrument legal. This makes each man his own tax collector.

A TELEGRAPH LINE has been completed from Loango, in the West African coast, to Brazzaville, in the Congo State, and a cable is being laid from the latter place to Stanley Pool, in the heart of Africa.

MINING SUMMARY.

Specially compiled and reported for the MINING AND SCIENTIFIC PRESS.

ALASKA.

The Circuit Court of Appeals at San Francisco has dismissed the suits now before Judge Noyes of Cape Nome, Alaska, in which Alexander McKenzie was appointed receiver of the gold and mining property in litigation. The appeal to the court was not for dismissal of the suits, but for the removal of McKenzie as receiver. The court decides that it has authority to inquire into the suits entirely and then dismisses the bills of complaint.

The Secretary of the Interior has ordered a new hearing in the contest over the land on which Skagway is situated. This is the land case from the Commissioner's decision on which both parties appealed.

ARIZONA.

COCHISE COUNTY.

The South Bisbee C. M. & T. I. Co. has bonded its copper properties near Bisbee to a Glasgow syndicate at $2,225,000 until September 1. The property comprises forty-seven patented claims, covering about 661 acres.

The work on the properties of the Lowell & Arizona M. Co. is partially temporarily suspended, water coming in at 980 feet in the main shaft, which is down 1018 feet. The present management, W. S. Clark Supt., took charge of the properties on Feb. 1st, and has since that date done over 2500 feet of drifting, almost entirely upon the lower levels. The question of the introduction of the necessary pumps is now being considered by the Eastern officials of the company.

GRAHAM COUNTY.

L. A. Dunham and C. F. Whitcher of Denver, Colo., are reported to have sold a large group of mining claims in the Greenlee district to an English company for a large sum. A large cash payment has been made. The property will be developed under L. A. Dunham, manager.

MOHAVE COUNTY.

J. Martin has bonded his gold mines on the west slope of the Harqua Hala mountains to the Mexican Copper Co. at $160,000. The same company have also bonded the Rogers properties, near the Bill Williams Fork of the Colorado river, and expect to operate heavily in this section, equipping their new purchases with modern machinery. The camps have already been started and a large force of men are being put to work.

SANTA CRUZ COUNTY.

C. W. Rice and J. W. Lennox of Helvetia, for Eastern people, have bonded the Tres Amigos gold mining property, in Oro Blanco district, from S. W. Champion of Alhambra, Cal., at $150,000. The purchasers are to increase the plant at once.

YAVAPAI COUNTY.

Machinery for the W. J. Lester Co. of Fredonia, N. Y., which company owns eight placer claims in the Big Bug district, has been placed on the ground, a steam shovel with an amalgamator attached, pumping water from the Big Bug creek.

L. T. Stoddard has arranged to start up the Stoddard copper properties on Copper mountain, near Prescott. It is understood the smelter will be blown in soon and a large number of men put to work.

The Octave M. Co., in Weaver district, has uncovered a large body of high-grade ore on the 600-foot level. The property belongs to a number of Standard Oil men.

YUMA COUNTY.

J. L. Eigholz, secretary of the Arizona Giant C. Co., says that improvements are contemplated by his company at Ehrenberg, among them being a smelter and a long-distance telephone line to Yuma via Picacho.

Judge J. Rivers has completed the installation of machinery on the Goodenough group, near Ehrenburg, of which he is Supt. A contract to sink a 200-foot shaft is to be let.

CALIFORNIA.

ALPINE COUNTY.

P. Kurtz, part owner and Supt. Boulder Hill mine, near Gardnerville, says the lead is from 1 to 3 feet in width and is free milling. A 10-stamp mill has been erected and it is expected to run steadily on ore blocked out.

AMADOR COUNTY.

At the Centennial mine, Drytown, Supt. Gross states they are still drifting for the north ore body.

The Amador Phœnix G. M. Co., recently incorporated, has begun operations on the Toscano claim, near Clinton. The company is composed of Jackson men, R. C. Rust being president; S. Spagnoli, treasurer; L. J. Fontenrose, secretary; J. E. Dye, superintendent.

BUTTE COUNTY.

Diamonds are being searched for near Cherokee and at Big Bend. It is reported several finds have been made lately.

The mine of W. Pinkston at Big Bend is to be further developed by sinking deeper.

Thornton, Wing & Co. have struck a good piece of gravel on the North Fork of Feather river near the Wing & Malone claim.

CALAVERAS COUNTY.

The Gwin Mine D. Co. has just declared dividend No. 21—$15,000—making $70,000 paid in 1901 and $221,500 to date since the reopening of the mine by the company.

The El Dorado quartz mine, in Smith's Flat district, has been bonded to J. J. Schmadeke of Angels at $40,000.

Work is being pushed at the Canary quartz mine, near Fricot City. The mine is a recent discovery by A. Poe and T. J. Earhart of Sheep Ranch, and some good rock has already been taken out. The shaft is now down nearly 100 feet.

EL DORADO COUNTY.

Alvinza Hayward and C. D. Lane have bonded the New Discovery quartz mine, near Latrobe, owned by S. Chaix and G. S. Estey, who discovered it in 1900. The surface indications are good.

HUMBOLDT COUNTY.

The John Burger copper mine, near Ornbaun valley, has been bonded to Halliday & Co. of London, England, at $150,000, their agent depositing $10,000 forfeit. The last payment is to be made in sixteen months, and the company further obligates itself to build a 30-ton smelter.

NEVADA COUNTY.

The Glencoe mine on Canada hill at Nevada City, owned by A. Nevins Sr., was examined by C. H. Noble and A. Nevins, acting for the London Exploration Co. It is said the mine may be opened up shortly.

SHASTA COUNTY.

It is believed a syndicate will be formed to fully explore Bunker Hill, near Redding, by a tunnel, to be driven from a point near the river, through the hill to the bed of Middle creek. The top of the hill is honeycombed with tunnels and drifts on small quartz seams, from which hundreds of thousands of dollars have been taken. All the seams run into large quartz ledges, but the pocket hunters have not gone down on them.

The Milkmaid Q. M. Co., at French Gulch, is crushing regularly with good results and plans have been made for extensive development. Sinking on the Wheeler ledge will be started soon.

L. Johnson noted some quartz lodes croppings in a Shasta City street and proceeded to sink on the ledge just outside the street line. At 10 feet depth he has from 18 to 24 inches width of a ledge prospecting rich in free gold. The ledge runs through the main street of the town and has been traveled over for fifty years without its possible value being noted.

It is reported that development work on the Mammoth copper mine, west of Keswick, has been resumed by an Eastern syndicate, operating under an option. The Mammoth is owned by R. M. Saeltzer, J. Wallace and other Redding people.

J. Pfeffer has bonded the Mullen and Poorman gold quartz claims in Lower Springs district to M. J. Graham, a Montana man, at $5000 until January 1, 1902, development work to be prosecuted without intermission.

The Hiatt mine, at Quartz Hill, has been started up with fifteen men. D. G. Hunt is manager.

The Gladstone, at French Gulch, has been reopened by Capt. Roberts and his associates, and it is reported that the ore shoot has been recovered and milling will soon begin. T. Saulsbury is manager.

SIERRA COUNTY.

J. W. Finney has completed the repairing of the main tunnel at the Fir Cap mine. One shift will be worked extending it until more air pipe is obtained. Five men are employed.

SISKIYOU COUNTY.

The Black Bear G. M. Co., incorporated in Maine, capital $1,000,000, with John Daggett of Black Bear as Supt., is preparing to sink a new double compartment shaft 600 feet from the surface into virgin ground, from which connection will be made with the old works. Men are at work putting in the machinery.

The Jilson & Roberts mine, near Hornbrook, has reduced its force to ten men, who are engaged in prospecting. The company has a large ledge of low-grade ore, but the mill is not suited to work low-grade ore on an extensive scale.

TRINITY COUNTY.

The cyaniding plant of the Headlight mine, near Trinity Center, is being installed and will begin extraction within a few weeks. The ore is iron gossan covering an area several hundred feet in extent with a probable thickness of at least 40 feet. It rests on unoxidized auriferous sulphide ore. The surface ore is said to assay $5 or $6 per ton.

TUOLUMNE COUNTY.

The Mapes quartz and placer mines, near Sonora, have been bonded to W. E. Coul at $5000. Men have been put to work developing.

The Golden West M. & M. Co. has bought a hoist to sink from 1000 to 1500 feet in depth, which they expect to start about July 1st. The mill grading is nearly complete and the mill is expected to begin crushing ore on July 1st. F. R. Restano is Supt.

The strike in the Dreisam mine at Arastraville continues good. The mill has been started.

The mill on the Ajax mine, on the Major ranch, is being overhauled and improved by the addition of new machinery. Two new concentrators and a Woodbury table are being put in. A pipe line, 1100 feet in length, will be laid from the ditch to the mine.

YUBA COUNTY.

The Grass Valley men who bonded the Cabbage Patch mine, near Wheatland, are working ahead and now have ore showing free gold in three different places. They will take out a large crushing and haul it to a mill in Grass Valley; if the ore pays sufficiently, a mill will be put up at the mine.

COLORADO.

BOULDER COUNTY.

The Miser group at Sugar Loaf, near Boulder, noted for its tungsten deposits, has been bought by the Great Western Exploration & Reduction Co. for $75,000. The new company is already realizing on its investment. The extent of the tungsten veins was not known for some time, but since they were uncovered they have been worked with a large force of men. The Boyd mill of Boulder has been leased to concentrate the tungsten ore, whence it is shipped to New York and brings from $125 to $200 per ton. The capacity of the mill will be enlarged.

CLEAR CREEK COUNTY.

J. F. Antisdale of Palmyra, N. Y., president of the Gum Tree Co., reports that the money has been raised to develop the mine, and that an air compressor and other machinery will be bought. Sinking of the shaft is to be resumed.

The Comstock L. & M. Co. has been incorporated by G. Hughes, H. C. Watt and C. Trumbull of Denver, capital $10,000, to operate mines in Arapahoe and Clear Creek counties.

The Happy Dream M. & M. Co. has been incorporated by J. A. Pearce, E. W. Dillon and J. W. B. Smith of this county, capital $300,000, to operate mining property in Colorado and elsewhere; principal office, Idaho Springs, Colo.; branch office at Wilkesbarre, Pa.

GILPIN COUNTY.

A consolidation of the Robert Emmett, Queen of the West and Golden Gate mines of Black Hawk has been made, and a cage shaft on the Robert Emmett, 425 feet in depth, will be sunk 200 feet deeper and a level run west to connect with the Queen of the West mine; W. H. Nicholls is manager.

GUNNISON COUNTY.

The Italian Mountain district, in the northeastern part of the county, promises to be very active during the summer. Dorchester, a mining camp founded last year, is the postoffice. It is a portion of the Tin Cup mining district. Lately the announcement was made that much of the dump thrown out from properties worked years ago was good ore. This brought new life into the locality and there are now several producing mines.

F. Adams, owning the old Denver City mine at Iris, is considering a proposition to bond the property, which has been idle for some years. The shaft has opened a good body of ore, carrying small values in silver and considerable zinc and copper, which could not be profitably treated in the past, but it is thought that the improvement in methods will permit of its being made a paying proposition.

HINSDALE COUNTY.

W. H. Davis of Colorado Springs and A. G. Gorham of Denver, of the Sherman M. & M. Co., operating the Sherman and Champion mines at Lake City, have started work on the property. E. Ray, a mining engineer, is manager. The Champion is a copper proposition. The Sherman has gold values predominating. Both are milling propositions and a mill will be put in shape for the treatment of the ore.

LAKE COUNTY.

I. Hale, E. S. Douglass and L. C. Robinson of the Leadville Electric Power Co. and H. L. Rogers, an electrical-hydraulic engineer, for capitalists who propose financing the company which is to transmit electrical energy from Homestake creek to supply Leadville and mines with power, have been inquiring into the average horse power consumed in the district, which is about 20,000 per day.

Leadville mine owners and operators are preparing to build a smelter at that place to reduce the heavy zinc-lead ores that are penalized at the custom smelters. The success of the mill running on zinc-lead ores at Rico has started the interest. The separation is effected magnetically and tests are being made on Leadville ores. J. P. Cappau of Joplin, Mo., and C. V. Petrius of Iola, Kan., have been in Leadville, looking into the zinc treatment proposition.

The Empire M. Co., on Long & Derry hill at Leadville, will begin making regular shipments to the smelters. The company was organized by S. G. Collins in Boston. At 300 feet from the surface a body of iron carbonates was opened up which nets the company $9 per ton.

At the Gordon mine, Twin Lakes district, the tunnel to get under the ore opened in the upper levels of the mine has now progressed 1200 feet into the mountain and is 800 feet below the surface. Connections are to be made with the ore body by upraises. Surveys are being made for a tramway and an amalgamating and concentrating mill, and work on them will commence as soon as the weather will permit hauling.

MINERAL COUNTY.

The American Sulphur & Mining Co. have made another payment of $1000 on the Sulphur mines. Work on the property is demonstrating that the sulphur beds are very extensive.

LARIMER COUNTY.

What promises to be a district of considerable importance has been opened near the northern boundary of the State on the eastern range of the Medicine Bow range, near Virginia Dale. Prospects found a year ago in Wyoming, just north of the line, have been found to extend into Colorado, along Trail, Sheep and Fish creeks, tributaries of the Cache la Poudre. Considerable placer gold has been found in all these streams, but it is not possible to work large tracts by hydraulics as the gulches are narrow. Several lodes have been opened.

PARK COUNTY.

The Colorado Springs Co. has made the first payment of $6000 on its bond on the Jim Blaine ledge. F. Leonard, of Alma, is manager. The owners are Colorado Springs people.

The London mine, Alma, is shipping $500 ore, value principally in gold. The vein is 6 inches to 2 feet wide. The London has produced to date about $1,500,000.

SAGUACHE COUNTY.

North of Crestone is a large district carrying low-grade, free-milling gold ores which promise well with further development and with milling facilities on the ground. The town of Pyke has been located there and has been made a postoffice, and covering an area several miles in extent around it are prospect holes sunk by prospectors who, looking for high-grade ore and failing to find it, abandoned many properties which would pay a profit if the ore could be milled on the ground. The developments range from 50-foot shafts to tunnels 600 feet long. One of these properties has several shafts and a tunnel 600 feet long and has opened a body of ore 35 feet across that averages $7.80 per ton in gold. Another property has a large ore body that runs $20 to the ton in gold, and several other claims that have less development show good veins running from $6 to $15 in gold, all free-milling.

SAN JUAN COUNTY.

A. Sturgeon, who has been operating the Smuggler lode, located in Cascade basin of Little Maggie gulch, has sold a half interest in the property for $500. The lode is an extension of the Anti-Periodic, from which extremely rich ore has been extracted for several years.

SAN MIGUEL COUNTY.

W. S. Buckley, manager of the Ophir Con. M. Co., says both No. 3 and No. 6 levels of the Butler claim at Telluride are carrying from 2 to 4 feet of mineral, from which enough first-class ore has been shipped to cover operating expenses. The foundation for the new mill will be begun next week. A tramway from mill to mine will also be installed.

The Japan Mines Co., Telluride, has leased 5 acres on the Gold Run placer from the Peck Cyanide Co., agreeing to erect a milling plant on the leased ground.

TELLER COUNTY.

W. H. Colburn, of Cripple Creek, has sold the Rustic and Necessity claims, in Cripple Creek district, to L. A. Colburn, for $5000.

Four towns in the Cripple Creek dis-

trict are in danger of a water famine by the bursting of the dam of the Victor reservoir at Pike's Peak. They are Victor, Goldfield, Altaman and Anaconda. Mining operations are also affected. The Portland mine depends on it for 100,000 gallons of water a day. Other mines will be forced to shut down. The dam contained 65,000,000 gallons of water, and a stream 20 feet deep and at places 300 feet wide went down the mountain through West Beaver valley to the Arkansas river.

The Brodie cyanide plant at Mound City, closed for eighteen months, is again in operation: W. Russell, manager. There are about 6000 tons of tailings available, carrying about $8 a ton.

The Practical Leasing Co., on the Pauper claim, will install a larger plant of machinery on their lease. The company intends to run a crosscut to the vein opened in the 125-foot level and which is supposed to be the extension of the Hull City placer vein.

The Anaconda Co. has given a lease on the dump of the old tunnel level on block 40 to a Mr. Camp of Cripple Creek. The royalties are at the rate of 25%.

The Transit G. M. Co. has made a strike in the Silver Bell claim. At a depth of 75 feet, 30 feet from the shaft, Lessee Cockburn has opened a good vein of ore, giving average assay values of $20.20 to the ton.

IDAHO.

BLAINE COUNTY.

Flood & Higgs have leased the Relief mine, adjoining the Minnie Moore, at Broadford, and will begin operations immediately.

An important discovery is reported in the Liberal mine, on the Hailey gold belt. A drift at a depth of 150 feet has opened 6 feet of solid ore that averages $38.44.

A. Griffith, superintendent of the Tyrannis mine at Hailey has received a cablegram from Mr. Thorndike of Paris, France, instructing him to build a mill at once at the Tyrannis.

The Tiptop mill, Hailey, has been started up.

ELMORE COUNTY.

A. Woodward of Chicago of the Golden Age M. Co. at Atlanta says that J. C. Johnson, president of the company, is now at Atlanta, preparing for extensive operations this summer. The 20-stamp mill is being repaired and will be started up. It is anticipated that considerable changes in the machinery of the mill will have to be made.

LEMHI COUNTY.

R. W. McBride has bonded the Gold Flint group near Leesburg, at $200,000, it is said.

SHOSHONE COUNTY.

It is reported that the Monitor group, carrying copper, in St. Regis district, owned by O. Hill and associates, has been bonded to Eastern parties at $150,000.

WASHINGTON COUNTY.

Arrangements for building the smelter at Weiser by L. Hall have been completed. The site is at the mouth of the Weiser canyon, about 8 miles from town. The plant will handle ores from the Seven Devils, Baker City, Sumpter, Mineral and other points.

MICHIGAN.

HOUGHTON COUNTY.

The report of the Osceola Con. M. Co. for the year 1900 shows 836,372 tons of rock mined, 683,066 tons stamped. The total receipts from sales of copper, etc., were $2,108,253 and total costs $1,559,530; balance, $576,715; dividends, $571,200. The cost of stamping was 27.2 cents per ton.

MONTANA.

The report of the Hecla M. Co. for 1900 shows: Ore mined, 2357 tons first class, 500 tons second class; smelted at company smelter, 2023 tons; shipped to Omaha, 834 tons; metal yield, 226.4 ounces gold, 232,820 ounces silver, 131,494 pounds copper and 1,013,524 pounds lead; receipts from sales of ore and bullion, $180,401; total expenses, $143,930; net balance, $36,471; dividends paid, $30,000; total production of mine to date, 208,623 tons. In twenty years—1881 to 1900 inclusive—total earnings, $10,189,648; total expenses, $8,123,071. Net earning, $2,066,577, and dividends, $2,027,500. The average earnings in 1900 on first class ore mined was $76.54 a ton and expenses $61.06 a ton. Cost of mining, $33.19 per ton; including second class ore, the cost of mining was $27.39 a ton.

BEAVERHEAD COUNTY.

It is reported that the New Departure silver mine, in the Blue Wing district, has been closed down indefinitely, the reason given by F. Brown, the manager, being that the mine will not pay to work with the eight-hour law in force.

In Dry Gulch canyon, east of Dillon, W. Spearin and others have discovered a ledge of gold-bearing hematite which carries $8 to the ton; the ledge is 5 feet wide.

FERGUS COUNTY.

The mill under construction on the Barnes group, in the North Moccasin district, will treat 100 tons daily. The building has been somewhat retarded by short lumber supply, but Supt. McClean says the plant will begin operations by July 1.

The Spotted Horse mine is being worked by the A. S. Wright Co. and employs twenty-five men. A new hoisting rig has been installed and the mine plant generally has been rehabilitated.

GRANITE COUNTY.

J. Hickley will superintend the Basin gulch placer claims, Phillipsburg, this season.

LEWIS AND CLARKE COUNTY.

Semensky & Kessler, two leasers at the Drumlummon mine, made $5400 for two runs last summer.

The East Helena smelter has resumed operation, the labor trouble having been settled.

The American Eagle mine, Helena, started yesterday morning after six months' shutdown. The high-grade ore will be shipped.

MADISON COUNTY.

J. Reed and F. Walker expect to do considerable development work on a coal vein in upper Ruby valley. A company has been formed at Virginia City. A plant may be installed to operate the coal mine quite extensively.

The Red Bluff M. Co., operating at Red Bluff, is reported to intend to build a hundred-ton concentrator at once. It is estimated that there is now blocked out over $600,000 of ore, from which concentrates will average about $100 per ton. The plant will be run by electricity.

PARK COUNTY.

E. B. Wittich of Livingston, representing an Eastern syndicate, has bonded nine claims near that place for six months. It is said that the syndicate has $50,000 to prospect with and that a diamond drill will be used.

SILVER BOW COUNTY.

The pay shoot lately struck in the Brown's Gulch Homestake mine is holding a width of from 3 to 4 feet. The drift has been advanced about 25 feet, and fifty tons of ore that will average $125 in gold to the ton have been taken out. The company is now figuring on sinking another 100 feet and driving a level from the bottom. C. Strowbridge is Supt.

NEVADA.

ELKO COUNTY.

The Dexter-Tuscarora Con. G. M. group, comprising twenty-two claims, is producing about 3400 tons of ore per month, the bulk of which is treated by the company's 40-stamp mill, whose saving is on amalgam plates, the tailings therefrom being cyanided. The result of the last year's work was a saving of $5.95 per ton of ore, the values being about two-thirds gold and one-third silver. There is now an accumulation of 20,000 tons of tailings, which will be cyanided. All the work and production thus far has been above the 300-foot level. There is one principal vein and several lateral veins. An electric power plant is operated by two Pelton 4-foot wheels from a flume and pipe line, which gives a 400-foot fall. The idea is to operate the mill, hoist and pumps by electric power.

Tuscarora, May 16.

WASHOE COUNTY.

The Reno Star mine, at Bryan City, is to have a large mill. The owner, G. Wedekind, proposes to use rolls, instead of stamps, and to give the ore the hyposulphite treatment. Besides rich shipping ore, the mine contains much lower grade rock that may be profitably worked on the ground.—More men will be put on at the Bell mine as soon as the drifts are advanced further to give room. A contract has been let to sink the main shaft. Mr. Bell will put a steam hoist on in four or five weeks.—The shipping output of the mines is now about thirty tons a day of ore running from $100 to $500 a ton. From indications, timbermen will soon be needed. Water is beginning to come in at a depth of 165 feet. As yet there is no necessity for pumps, but a little more depth may require them.

A petition has been circulated at Reno among claim owners, and numerously signed, for a meeting of mining men, to organize a mining men's association, to be a protective organization and to foster the mining industry in the county. One of the ideas is to establish a headquarters for exhibits of ore, plats of mines and literature regarding the mineral resources.

NEW MEXICO.

GRANT COUNTY.

G. McMillan has bought the Lucky Bell at Central and has commenced work on it. The ore runs well in lead and silver.

B. S. Tipton & Co. of Duncan have four claims at Cottonwood, which they have developed considerably. Smelter returns on high-grade ore were 26% copper, thirty-five ounces silver and $2 gold per ton.

The Clear Lake M. Co., A. W. Tennant manager, have sunk a shaft 100 feet and run drifts 100 feet each way along the vein, which is said to be 11 feet wide, milling $16 per ton in gold. The company has a 10-stamp mill, which is shut down until additional concentrating tables and other machinery can be put in.

A test shipment of ore from the Lord Nelson property at Central was made by the owner, G. Sanders, to ascertain the best method of treatment.

C. Wickey and R. M. Randall have bonded their group of claims near the Fort Bayard reservation to Pinos Altos parties, who will develop them.

LINCOLN COUNTY.

The Ruby mine at White Oaks has closed down. A meeting of the stockholders has been called for the purpose of determining a plan for future operations. A hoist, stamp mill and cyanide plant are necessary for further development.

The Estry M. & M. Co. has been incorporated, capital $500,000, by M. W. Seymour, J. R. Tyman and H. B. Clark.

TAOS COUNTY.

E. L. Fowle, president of the New Mexico G. M. Co. of Milwaukee, is inspecting the machinery which his company is putting on the Strawberry mine, near Tres Piedras.

OREGON.

BAKER COUNTY.

W. L. Vinson has bonded the Mammoth group at Baker City. It is his intention to sink a double-compartment shaft 100 feet and then to drift 100 feet on the ledge. The ledge is 6 feet wide and carries free gold.

The 20-stamp mill of the Cornucopia M. Co., Ltd., is to start up immediately. Twenty-five men are working on the 4000-foot tunnel, run for the Last Change mine, owned by the same company and are in 1710 feet.

The recorded deed of the Bonanza mine, bought recently by the Con. Bonanza G. M. Co. of Philadelphia, composed of Standard Oil people, discloses that the price paid was $500,000 cash. The owners now value the mine at $3,000,000.

The final payment of $20,000 on the Appomattox mine at Baker City by the Columbia M. Co. has been made.

GRANT COUNTY.

Z. Houser of Portland and Hinkley & Newman of Pendleton, owners of the Copper King mine at Quartzburg, are closing a deal for a smelter. Mr. Houser says returns from a shipment of ore to Hamburg, Germany, were at the rate of $384.64 per ton. The transportation from Quartzburg to Hamburg is $30 per ton.

JOSEPHINE COUNTY.

Houck & Haff have bonded the Bowden ledge at Gold Hill and contemplate immediately putting up a hoist and sinking the main shaft to a greater depth.

It is reported that the Copper Stain, at Mount Reuben, is soon to be operated on a larger scale. Supt. J. E. Hutson says that an average of 50 feet per month in the tunnel has been made since February.

The Wimer Bros. & Co. mine, near Waldo, is now owned by the Deep Gravel M. Co., of which W. J. and G. W. Wimer are managers.

A large amount of development work is reported to have been done on Kubli Bros.' Gold Standard mine, on Galls creek, during the past few months. There are now about 4000 feet of tunneling and a depth of 300 feet has been reached.

J. S. Pool, owner with G. Hoffman of a quartz mine in the Applegate district, has sold his interest to F. Bolt of Gold Hill.

H. A. Corliss, Pres. Dry Diggings M. Co., has cleaned up the season's run. A thirty-five day run yielded $4000, or about $115 per day with one giant.

MALHEUR COUNTY.

A rich gold strike was made in the Little Giant mine at Malheur City. The ledge is about 12 feet wide and has been uncovered for 300 feet. It is owned by R. D. Carter and F. Clark of Baker City.

SOUTH DAKOTA.

PENNINGTON COUNTY.

It is said the Elizabeth M. Co. of Milwaukee will erect a 40-stamp mill and cyanide plant this season at the Bismarck mine, near Keystone.

About 200 mining companies are now operating in the Black Hills, besides individuals and partnerships. Total number of miners at work is about 4500. Value of the metallic output during 1900—mainly gold—was a little less than $10,500,000.

LAWRENCE COUNTY.

The 1200-ton cyanide plant of the Homestake M. Co. at Lead City is operating successfully. It contains fourteen steel tanks, each of capacity for 600 tons of tailings. The treatment takes seven days, two tanks being emptied and filled every day. The average value of tailings treated is $1.50 per ton. The Homestake Co. is using 940 stamps and treating about 2000 tons of ore daily. The tailings from 540 go to the new cyanide plant. The other stamps are so located that their tailings cannot be brought by gravity to the new mill. Consequently, the company will very likely erect another plant for the remainder of the stamps.

UTAH.

JUAB COUNTY.

The Alaska M. Co. of Tintic at the annual meeting elected F. L. Oswald, J. E. Bamberger, L. R. Rogers, H. Bamberger and W. E. Webster directors, and A. E. Kimball of Salt Lake City was made secretary and treasurer. The annual report showed receipts from all sources for 1900 were $26,812.23. Manager J. E. Bamberger says it is intended to sink the shaft from the 450 to the 600-foot level in a short time.

The Bullion-Beck of Tintic has sued the Eureka Hill and Gemini mining companies for $2,300,000, value of ores and damages which it claims the two defendant companies are liable for. The Bullion-Beck Co. claim the Eureka Hill Co., M. C. Fox and G. W. Riter entered its ground and in the past four years have extracted over 25,000 tons of ore, worth $38 per ton net, or $950,000. The Gemini Co., J. Q. Packard and J. C. McChrystal are accused of extracting during the past three years 30,000 tons of ore, worth $45 per ton, or $1,350,000. It is also charged against the Eureka Hill that, after they had mined the ores in question, they caved in the stopes to conceal the trespass.

SALT LAKE COUNTY.

L. Ransohoff and F. Shirer are reported to have made a strike in their mine at Bingham. It is a copper and gold proposition. The owners propose to organize a company called the Elks G. & S. M. Co.

The Boston-Terrace C. M. Co. has incorporated, capital $500,000; C. T. Birchard is president and A. H. Folger of Salt Lake City secretary.

W. C. Orem of the Red Wing M. Co. of Bingham has bought the Eda claim of N. G. Jarrard and J. Lancina for $4000. It is understood that it was bought for the Red Wing Co.

TOOELE COUNTY.

The Stockton G. M. & M. Co. option on the property of the Lion Con. at Stockton has been ratified and a first payment of $2500 made. By May 19, 1902, a final payment of $37,500 is to be made; J. J. Trenam is manager.

WASHINGTON.

SPOKANE COUNTY.

A strike of free milling quartz has been made near Latah. M. Poore and S. G. Hinson, the discoverers, have staked three claims which show a 36-inch ledge, from which they say they get assays of from $20 to $25 a ton.

WHITMAN COUNTY.

Two claims near Palouse have been bonded for thirty days to Iowa capitalists by H. A. Keym, and development work is to be begun at once.

WYOMING.

CARBON COUNTY.

The Battle Lake Tunnel Site Co. of Chicago will run a 3000-foot tunnel into Mount Bridger, near Saratoga, from the north, and are already in 300 feet, working with air compressor and drills.

It is reported that the Ferris-Haggerty copper mine, near Grand Encampment, is about to be sold to Boston parties for a large sum. The mine is now shipping sixty tons of high-grade ore to the railroad per day.

CHEYENNE COUNTY.

The Centurion G. M. Co. has been incorporated by W. H. Metz, C. Sachs and H. Versteeg; capital $200,000; to operate in Wyoming and in El Paso, Teller and Clear Creek counties, Colorado, with principal offices at Colorado Springs, Colo., and Cheyenne, Wy. W. H. Metz of Colorado Springs is president of the company.

FOREIGN.

BRITISH COLUMBIA.

The directors of the Brittania Copper syndicate are reported to have decided not to accept the modified offer of $900,000 in cash and stock which was made for their property by Bewick & Moreing of London. The Brittania group consists of seven claims on Howe sound, about 28 miles from Vancouver, discovered about eighteen months since. The showing of ore in sight is estimated at from 1,000,000 to 2,000,000 tons. The syndicate owns a seven-tenths interest in the group, and L. J. Boscowitz of Vancouver the rest. The bond expired on Friday, when the London promoters offered $400,000 in cash and

$500,000 worth of stock in a company to be formed with a capital of $2,500,000, with a working fund of $600,000 cash, but the directors have decided not to accept it.

J. Williamson, F. Cottle and S. Coff, on their location on No. 2 creek, Windermere, have developed, by a 50-foot crosscut tunnel, gaining a depth of 60 feet, 30 inches of solid galena ore and 3 feet of concentrating ore.

MEXICO.

M. Muller of the Banco de Sonora, Hermosillo, and W. R. McGuire of La Colorada, have bonded to J. L. Greene and associates of San Francisco the Buena Vista copper mine in the Gabilan country, about 40 miles east from Hermosillo, and work under the bond will begin at once.

THE KLONDIKE.

An energetic and progressive policy is promised by the Dominion Government in the Yukon under the new administration, so J. H. Ross, the new commissioner, states. Several matters of importance are to be immediately taken up by him, investigated, and reported to Ottawa for final action. Among these will be the granting of hydraulic concessions, royalty, the establishment of assay offices, and the question of gold dust commercially. The granting of concessions may be left to him. He makes the announcement that the new royalty regulation leaves the exemption clause just as it was under the old.

Personal.

R. C. GEMMELL has returned to Salt Lake City, Utah, from Mexico.

J. M. CALLOW of Salt Lake City, Utah, is in Silverton, Colo., on special work.

W. A. WILSON of Salt Lake City, Utah, recently returned from Morenci, Ariz.

F. MCELERY of Eureka, Utah, has been appointed assayer at the Tip Top mine, Hailey, Idaho.

S. C. MCCLURE, Supt. Watseka mine, Rochester, Mont., is sojourning in Salt Lake City, Utah.

C. A. MOLSON, consulting engineer for the Tom Boy and other mines, was in Salt Lake City, Utah, on the 20th inst.

JOHN CHAMPION, formerly Supt. Sheep Ranch mine, Calaveras county, Cal., is in British Columbia examining mines.

W. E. BRANDON of Denver, Colo., has been appointed Supt. Mulatos mine, Sahuaripa district, Sonora, Mexico.

F. E. SHEPARD, Pres. Denver Engineering Works, Denver, Colo., was in Salt Lake City, Utah, on the 17th inst.

C. H. MALLORY, M. E., is engaged in examining copper properties in Chihuahua, Mexico, for the London Ex. & Dev. Co.

A. GRAVES, M. E., of Denver, Colo., is now located at Carbo, Sonora, Mexico, opening a large copper mine near that place.

L. L. NUNN of the Telluride Power & Transmission Co. of Telluride, Colo., and Provo, Utah, was in Salt Lake City on the 15th inst.

DAVID ROSS, who has been superintending a mine in Oregon for several months past, has returned to Sutter Creek, Cal.

BUCKLEY WELLS, M. E., of Boston, Mass., who has been examining the Shannon copper mines at Clifton, Ariz., has returned home.

G. M. FORD, who has been in Ursan, Corea, for over two years, has returned to his home, Auburn, Cal. He expects to return to Corea soon.

G. S. ESTEY, of Latrobe, El Dorado county, Cal., has gone to Golovin Bay, Alaska, with a party of miners to open up mining property there.

FRANK P. SWINDLER, for two years Gen. Supt. DeLamar mine, at DeLamar, Nev., quit that position on May 10th and is now in Salt Lake City, Utah.

J. H. ROBERTSON, manager South Homestead mine, at White Oaks, N. M., has gone to his home, Scranton, Pa., on business connected with the mine.

BARNEY BARINDS of Spokane, Wash., goes to Cape Nome about June 1st to make an examination of the quartz properties in which P. Clark is interested.

P. J. DONOHUE of Salt Lake City, Utah, manager of the Sivirijoa M. Co, has gone to the mines in Fuerte district, Sinaloa, Mexico, to start up the work.

J. H. OMERT, formerly Supt. Spenceville copper mine, Nevada county, Cal., has gone to Corea to remain in charge of mining operations there for three years.

W. E. BLAKESLEE, Supt. of construction of the Bully Hill smelter, Shasta county, Cal., for the Trent Engineering & Machinery Co., has completed his work and returned to Salt Lake City, Utah.

Obituary.

BENJAMIN THOMAS LACY, president of the Parke & Lacy Co. of San Francisco, Cal., died at his residence in this city on May 21st, aged 56 years. Deceased was a machinist by trade, and, with Charles Burleigh, perfected the Burleigh air drill and air compressor. He was in charge at the Hoosac tunnel when these machines were put in there, and subsequently assisted in removing the Hell Gate rocks in New York harbor. He subsequently went to Europe with drills for the Mont Cenis tunnel and returned to put machine drills at work in the Sutro tunnel at Virginia City, Nev. Meeting there the late L. C. Parke, the firm of Parke & Lacy was formed, which has grown and extended till it now has branches in Australia and in London. Socially, Mr. Lacy was a man highly esteemed and respected by all who knew him.

Books Received.

Transactions of the Australian Institute of Mining Engineers, Vol. VII, 1901, 200 pages, is an exceedingly interesting and practical compilation of papers on mining in that country. It is an excellent illustration in recorded form of the close touch with each other of the advanced art of mining in all countries at the present time. Published at Melbourne, Victoria, by the Institute.

A Contribution to the Geology of the John Day Basin, by John C. Merriam, 45 pages, issued by the University of California as a bulletin of the Department of Geology, is a work of much technical interest to geologists. It does not consider the economic geology of the region. Both placer gold - bearing lodes are proving profitable for exploitation in some of the headwater streams of the John Day river.

Journal of the Western Society of Engineers, Vol. VI, No. 2, April, 1901, by the Society, 1734 Monadnock Building, Chicago, contains five papers of practical interest to civil engineers. "Factors which Cause the Decay of Woods," by Prof. H. Von Schrenk, will be interesting to miners by whom some cheap means of preventing the decay of timbers used in permanent mine openings is very much wanted.

Miners and Prospectors' Guide, revised third edition, published by James Irving & Co., Los Angeles, Cal. It is a handy pocket volume of 107 pages, containing in a compact, easily referred to form much general information that miners and prospectors find useful, and which it is not usual to find under one cover. Price 25 cents.

Catalogues Received.

Fraser & Chalmers Co., of Chicago and London, have issued the tenth edition of their catalogue No. 4 in a volume of 320 pages, profusely illustrated, and containing, in addition to minutely detailed explanatory text and specifications of their manufactures of mining machinery, explanations of processes and comparative costs of different schemes of ore treatment, briefly just what the mine owner wants to know in advance of constructing a treatment works. The catalogue can be had on application to Fraser & Chalmers, Twelfth St. and Washtenaw Ave., Chicago, Ill.

Advance Sheet No. 10 of the Jeanesville Iron Works Co. of Denver, Colo., and Jeanesville, Pa., illustrates and explains, in brief, comprehensive form, the mechanism and action of the Jeanesville triplex electric pumps which they are manufacturing.

Commercial Paragraphs.

G. P. KELLER is manufacturing his Keller balance at Salt Lake City, Utah.

J. GEO. LEYNER, manufacturer of compressors and air drills, Denver, Colo., has opened a branch at Salt Lake City, Utah, of which M. W. Winchester will have charge.

THE Saxton Steam Wagon & Automobile Co., whose works are at 515 Sixth St., San Francisco, Cal., is building a steam omnibus for Smith & Kuhn, Gray's Harbor, Wash. It is to run between Hoquiam and Aberdeen, a distance of 5 miles, and will carry thirty-six passengers.

THE American Engineering Works of Chicago has recently received a number of export orders for mining and industrial cars, to be equipped with their patent Anaconda wheels and axles. These orders have been from England, Japan, Mexico, British Columbia and Alaska. This company is also filling a number of export orders for shells for crushing rolls made from their special A.E.W. steel.

Latest Market Reports.

SAN FRANCISCO, May, 23 1901.

SILVER—Per oz., Troy: London, 27½d (standard ounce, 925 fine); New York, bar silver, 59⅞c (1000 fine); San Francisco, 59¾c; Mexican dollars, 50c San Francisco, 48¾c New York.

COPPER.—New York: Lake, 1 to 3 casks, $17.25; carload lots, $17.00; Electrolytic, 1 to 3 casks, $16.75; carload lots, $16.62½; Casting, 1 to 3 casks, $16.60; carload lots, 16.50. San Francisco: 18. Mill copper plates, 20c; bars, 22@23c. London: £69 12s 6d per ton.

The New Jersey courts have refused the injunction against the purchase of the Boston & Montana and the Butte & Boston by the Amalgamated Co., and the latter is arranging to increase its capital to buy them in. This result had been anticipated and discounted. London stock in sight is becoming very small, but the rate of consumption is not decreasing as traders there anticipated. The market conditions would indicate that there could be no immediate slump in prices.

LEAD.—New York, $4.37½; Salt Lake City, $4.00; St. Louis, $4.32½; San Francisco $4.90, carload lots; 5¼c 1000 to 4000 lbs.; pipe 6, sheet 6½, bar 5¼c; pig, $5.25. London, £12 2s 6d per ton=2.77½ cents per ℔.

SPELTER. — New York, $4.20; St. Louis, $3.75; London, £16 2s 6d per ton =3.58½ cts. per ℔; San Francisco, ton lots, 5¼c; 100-lb lots, 6c.

ANTIMONY.—New York, Cookson's, 10c; Hallett's, 9c; San Francisco, 1000-lb. lots, 10c; 300 to 500 lbs., 11c; 100-lb. lots, 13@15c.

IRON.—Pittsburg, Bessemer pig, $17.25; gray forge, $16.50; San Francisco, bar, per lb., 2.65c in small quantities.

STEEL.—Bessemer billets, Pittsburg, $24; open hearth billets, $27.00; San Francisco, bar, 7c to 12c per lb.

TIN.—New York, pig, $26.00; San Francisco, ton lots, 28c; 1000 lbs., 28¼c; 500 lbs., 28½c; less, 29c; bar tin, ℔ ℔, 32½c.

QUICKSILVER. — New York, $51.00 large lots; London, £9 2s 6d; San Francisco, local, $47.00 ℔ flask of 76½ lbs.; Export, $45.00

MAGNESIUM.—New York, $2.90 ℔ ℔.; San Francisco, $3.75.

ZINC.—San Francisco, 5¼c; slab, 5¾c; bar, 7c; zinc dust, N. Y., 8c.

BABBITT METAL.— San Francisco, No. 1, 10c.

SOLDER. — Half-and-half, 100-℔. lots, 18c; San Francisco, Plumbers', 100-℔. lots, 15c.

PHOSPHORUS. — F. o. b. New York 50@60c ℔ ℔.

ASSAY LITHARGE.—San Francisco, 10c ℔ ℔, small lots.

BISMUTH.—New York, ℔ ℔., $2.25 50-℔ lots; San Francisco, $2.50 to $2.75 ℔ lots.

FERRO-MANGANESE. — Pittsburg, 80%, domestic, $62.50, large lots.

TUNGSTEN.—New York, ℔ ℔., 95c; San Francisco, $1.15.

FERRO-TUNGSTEN. — New York, 37%, 32c; San Francisco, 65c (60%).

NICKEL.—New York, 50@60c ℔ ℔.

PLATINUM.—San Francisco, crude, $22 ℔ oz.; New York, $22 per Troy oz

ALUMINUM.—New York, No. 1, 99% pure ingots, 35c; No. 2, 90%, 30c to 35c.

POWDER.—F. o. b. San Francisco: No 1. 70% nitro-glycerine, per ℔., in carload lots, 15½c; less than one ton, 17½c. No. 1*, 60%, carload lots, 13½c; less than one ton, 15½c. No. 1** 50%, carload lots, 11¾c; less than one ton, 13¾c. No. 2, 40%, carload lots, 10c; less than one ton, 12c. No. 2* 35%, carload lots, 9½c; less than one ton, 11½c. No. 2** 30% carload lots, 9c; less than one ton, 11c. Black blasting powder in carload lots, minimum car 728 kegs, $1.50 per keg; less car lots, $2 per keg.

CAPS.—3x, $5.50 per 1000; 4x, $6.50; 5x, $8; Lion, $9, in lots not less than 1000.

FUSE.—Triple tape, $3.60 per 1000 feet; double tape, $3.00; single tape, $2.65; Hemp, $2.10; Cement No. 2, $3.00; Cement No. 1, $2.65, in lots of 3000 feet and up.

CANDLES.—Granite 6s, 16 oz., 40s., 10¾c ℔ set; 14 oz., 40s., 9¾c.

CHEMICALS.—Cyanide of potassium, 98%-99%, jobbing, 32½@33½c ℔ ℔.; carloads, 30@31c; in 10-℔. tins, 40c; sulphuric acid, in carboys, 66% B, 2c ℔ ℔.; soda ash, $1.90 ℔ 100 lbs. 58%; hyposulphite of soda, 2¾@3c ℔ ℔.; blue vitriol, 5¾@6½c ℔ ℔.; borax, concentrated, 7@8c ℔ ℔.; chlorate of potash, 12@13c; roll sulphur, 6c; alum, $1.90@2.00; flour sulphur, French, 2¼@ 2½c; California refined, 1¾@2c; nitric acid, in carboys, 8c ℔ ℔.; caustic soda, in drums, 3@4c ℔ ℔.; Cal. s. soda, bbls., $1.00; sks, 95c ℔ 100 lbs.; chloride of lime, spot, $2.50@2.60; nitrate of potash, in kegs, 8c: caustic potash, 10c in 40-℔. tins.

OILS.—Linseed, pure, boiled, bbl., 75c; cs., 80c; raw, bbl., 73c; cs., 78c. Deodorized Stove Gasoline, bulk, 14½c; do., cs., 20½c; 86° Gasoline, bulk, 20c; do., cs., 26c; 63° Naphtha or Benzine, deodorized, in bulk, per gal., 13½c; do., in cs., 19½c; Lard Oil, Extra Winter Strained, bbl., 75c; cs., 80c; No. 1 bbl., 50c; cs., 55c. Neatsfoot Oil, coopers' bbls., 60c; cs., 65c; No. 1 bbl., 50@52½c; cs., 55@57½c.

COAL. — San Francisco, coast, yard prices: Wellington, $9; Seattle, $7.00; Coos Bay, $5.50; Southfield, $9.00. Cargo lots, Eastern and foreign: Wallsend, $8.00; Brymbo, $7.50; Pennsylvania, hd., $14.00; Scotch, $8; Cumberland, $12; Cannel, $9.50; Welsh Anthracite, $12.00; Rock Springs, $8.50; Colorado Anthracite, $14.50. Coke, $16 per ton in bulk; $18 in sacks.

Recently Declared Mining Dividends.

	Payable.
Homestake M. Co., South Dakota, monthly and extra 25 cents per share, $105,000	May 25
May Day M. Co., Utah, 2 cents per share, $8000	June 1
Gold Coin G. M. Co., Colo., monthly, 3 cents per share, $30,000	May 25
Wasp No. 2 G. M. Co., S. D., $3200	May 20
Ymir G. M. Co., B. C., 24 cents per share, $48,000	May 16
Standard Con. G. M. Co., Cal., 10 cents per share, $17,839	May 21
Smuggler G. M. Co., Colo., monthly, 3 cents per share, $30,000	May 15
Gwin M. D. Co., Cal., No. 21, 15 cents per share, $15,000	May 20
Bald Butte M. Co., Mont., monthly, 6 cents per share	May 18

New Patents.

DEWEY, STRONG & CO.'S SCIENTIFIC PRESS PATENT AGENCY, 330 Market St., S. F., has official reports of the following U. S. patents issued to Pacific coast inventors:

FOR WEEK ENDING MAY 14, 1901.

674,191 —DRIVE WELL DEVICE — Allen & Grow, Hueneme, Cal.
673 995.—PREPARATION OF RYE, ETC.—A. Bardet, S. F.
674.131.—FRUIT PRICKER — H. M. Barngrover, S. F.
674,232.— SEAMLESS TOOTH CROWNS—B. B. Brewer, S. F.
674,232.—SEAMLESS TOOTH CROWNS—B. B. Brewer, S. F.
674,161 —NOZZLE HOLDER—L. N. Brown, Los Angeles, Cal.
673.977.—OIL BURNER—J. A. Clark, Los Angeles, Cal
674,258.—ROTARY ENGINE—T. Croston, Hoquiam, Wash
674,082 —BICYCLE — Eastman & Sayer, Adams, Or.
673.947.—BEDSTEAD FASTENER—Gilham & Souder, Lagrande, Or
673,983 —TROMBONE — E. Harrison, Los Angeles, Cal.
674.115 —WHEEL NUT — C Heilrath, Sacramento, Cal
673 871.—STEAM TURBINE—R Hewson, S. F.
674 008 —LUBRICATING DEVICE—M. Kraker, S. F.
674 119.—SOLE EDGE TRIMMER — E. F. Maxwell, S F.
674.275.—CUT OFF—A. W. Millen, Overton, Cal.
674,015 —DUST PROTECTOR—J E. Ragsdale, Fresno Cal
674,318.—VEHICLE—J. Rey, Maxwell, Cal.
674,284.—FIREARM—G. A. Sachs, Eugene, Or.
674,012.—WINDMILL—A. M. Springer, Portland, Or.
674,146.—MAP—T. B. White, Portland, Or.

Notices of Recent Patents.

Among the patents recently obtained through Dewey, Strong & Co.'s SCIENTIFIC PRESS U. S. and Foreign Patent Agency, the following are worthy of special mention:

LUBRICATING DEVICE. — No. 674,008. May 14, 1901. M. Kraker, San Francisco, Cal. This invention relates to a device for containing and applying lubricants. It consists of a transparent containing cup, a cover fitting and locking thereon and having a central rod or pin extending inwardly to dip into the lubricant, and a means attached to the cover by which the device may be suspended at any desired or convenient point with relation to the machine upon which it is to be used.

PREPARATION OF RYE — No 673 995. May 14, 1901. A. Bardet, San Francisco, Cal. This invention relates to the decortication of rye and like cereals as a food product, and consists in first reducing the grain into small particles, then subjecting the particles to heat and agitation so as to separate the skin from the bran, and means for separating the bran from the grain.

STEAM TURBINE — No 673.871 May 14, 1901. Robert Hewson, San Francisco, Cal. This invention is designed to employ steam within a disk revolubly mounted upon an axle shaft having buckets formed upon opposite sides of its periphery, and fixed casings between which the disk is revoluble in close contact. Concentric rows of depressions are formed in the casings, with intervals serving to cut off the adjacent rows, and concentric chambers connected with the casings and subdivided with passages through which an elastic medium under pressure is admitted into the buckets of the disk whereby the latter is impelled, the medium being transmitted by the movements of the buckets from one set of casing depressions to the next adjacent ones, so that it acts expansively within the next set of buckets and passages.

BICYCLE BEARING DUST PROTECTOR.—No. 674,015. May 14, 1901 J. E. Ragsdale, Fresno, Cal. This invention is an improved dust protector and consists of a cap having a central opening for the wheel axle, an annular offset or shoulder forming an outer portion which encloses the end of the hub, and a wide vertical flange extending radially outward and fitting a channel or depression in the sprocket wheel, but not in direct contact with the inner periphery. The surface of the sprocket wheel projects slightly beyond this disk, and thereby causes any dust to fall beyond the disk and not pass between it and the wheel.

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After May 20, a young man (33) with college training and three years' experience as assayer, cyanider and assistant superintendent, successively, with prominent mining company, wishes a similar position, or would manage a small property at a reasonable salary. References. Address M. T., 880 Eddy St., San Francisco.

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WANTED —A position as foreman by a man of 25 years' practical experience in mining in different mines of California Have had the handling of forces of men. Can go through and secure any kind of ground. Best of references. Address R. M., care Mining and Scientific Press.

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WANTED.—I have orders from Eastern capitalists for the following described properties: One large, well equipped gold mine with ore in sight, and improvements, to justify a value of from $1,000,000 to $5,000,000; also, one large copper mine of like size and value All business strictly confidential. Apply to E. J. FRASER, No. 622 Parrott Building, San Francisco, California.

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YUBA CONSOLIDATED GOLD MINING COMPANY.—Location of principal place of business, San Francisco, California; location of works. Nevada County, California.

Notice is hereby given, that at a meeting of the Board of Directors, held on the 10th day of May, 1901, an assessment (No. 1) of one (1) cent per share was levied upon the capital stock of the corporation, payable immediately in United States gold coin to the secretary, at the office of the company, Room 801, Claus Spreckels Building, San Francisco, California.

Any stock upon which this assessment shall remain unpaid on the 25th day of June, 1901, will be delinquent and advertised for sale at public auction; and unless payment is made before, will be sold on MONDAY, the 15th day of July, 1901, to pay the delinquent assessment, together with the costs of advertising and expenses of sale.

By order of the Board of Directors.

EDWARD H. STEARNS, Secretary.

Office—Room 801, Claus Spreckels Building, San Francisco, California.

Electric, Railway and Manufacturers' Supply Co.

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FOR SALE.

The irons for a heavy pump bob, formerly used on 6-inch Jackhead pump, including cast bearing for elbow joint, with bolts and straps; cost $160; will be sold for $75 cash. Address IRA HILL REED, San Andreas, Cal.

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A fine set of assay scales with pulp balance, and set of assay ton weights, all in good order, will be sold for $125. If applied for soon. The outfit consists of one Troemner's No. 5 balance with aluminum beam and agate bearings, mounted in glass case with sliding doors and plate glass bottom, original cost $175; also one Becker's pulp balance No. 18, with 8-inch beam, mounted in glass case with sliding doors, costing $26. Further particulars by addressing Box 4, San Andreas, Cal.

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OF THE ELEVATOR TYPE.

With buckets having capacity of seven and a half cubic feet. Dredge only used few months. Located on Grasshopper creek, near Bannack, Mont. For full particulars, address THE BUCYRUS COMPANY, South Milwaukee, Wis.

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All of the gold mines contain free-milling ore, are all easily accessible by rail and good roads, and are amply supplied with water and timber. They are offered at owners' bedrock prices, and are all good bargains.

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Special Meeting.

OXFORD BETA TUNNEL AND MINING Company.—There will be a special meeting of the stockholders of the Oxford Beta Tunnel & Mining Company, to be held at the office of the company, No. 135 Geary St., Room 111, San Francisco, at the hour of 4 o'clock P. M., on the 4th day of June, 1901, for the purpose of increasing the capital stock of the company from twenty-nine hundred shares of the value of one hundred dollars each to one hundred thousand shares of the value of two dollars and fifty cents each. By order of the Board of Trustees. W. H. KNIGHT, Secretary.

ANNUAL MEETING.

The Regular Annual Meeting of the Stockholders of the National Cons. Mining Company will be held at the office of the company, 773 Mission St., San Francisco, California, on MONDAY, the 3d day of June, 1901, at the hour of 3 o'clock P. M., for the purpose of electing a Board of Directors to serve for the ensuing year, and the transaction of such other business as may come before the meeting.

GEO. W. FLEISSNER, Secretary.

Office—773 Mission St. San Francisco, California.

Notice of Meeting of Stockholders.

In accordance with the by-laws of that company, the Regular Annual Meeting of the Stockholders of the JAMISON MINING COMPANY, for the purpose of electing Directors for the following year and transacting such other business as may properly come before it, will be held at the office of the company, rooms 54-59, No. 120 Sutter street, San Francisco, California, at 2 o'clock P. M on MONDAY, the 20th day of May, 1901.

SAM W. CHEYNEY, Secretary.

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14 Standard Amalgamating Pans.
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4 Cleanup Pans.
8 Amalgam Safes.
15 Quick Elevators.
4 Amalgam Cars.
5 Quick Tanks.
3 Retorts and Bullion Furnaces.

Two of these mills were dry crushing, containing the following roasting and drying machinery:

Howell Improved White Roasting Furnace (60x27).
3 18-Foot Revolving Ore Dryers.
1 Bruckner Roasting Furnace.
1 40-Foot Pierce Roasting Furnace.

All of these plants were fully equipped with power, including Corliss engines (18x42); tubular boilers and Heine water tube boilers; feed water heaters, and pumps.

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12¼x14 Ingersoll-Sergeant.
16x14x10½ Norwalk.
12x14 Rand.
10x12 Knowles Belt Driven.
6x8 Knowles Belt Driven.

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S. K. HOOPER, G. P. & T. A., Denver, Colo.

THE CALIFORNIA DEBRIS COMMISSION, HAVING received applications to mine by the hydraulic process from Charles Lilly and W. E. Emery, in the Avalanche Mine, near Vallicita, Calaveras Co., to deposit tailings in Grapevine Gulch; and from W. J. Cox and F. E. Keesy, in the Taylor Diggings, near Taylorsville, Plumas Co., to deposit tailings in Hinchman Creek, gives notice that a meeting will be held at Room 59, Flood Building, San Francisco, Cal., on May 27 1901, at 1:30 P. M.

120-Stamp Mill

At Hassel, Montana,

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Erected in 1897 by the Union Iron Works of San Francisco.
Only Partially Operated for a Few Months.
Guaranteed in Splendid Condition.

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26 ORE BIN GATES, 20″ x 24″, made of $\frac{5}{16}$″ steel plates, with racks, guides, boxes, pinions, shafts and hand wheels.
11 UNION CHALLENGE ORE FEEDERS, 11 right and 11 left.
11 10-STAMP BATTERIES. Stamps weighing 1000 lbs. each, arranged to be run in mortars of 5 stamps each, driven by belt and tighteners. Mortars especially arranged and designed for inside amalgamation, and weigh with apron 6500 lbs. each. (5 batteries never used.)
66 COPPER PLATES, 4′ x 5′, weighing 5 lbs. per square foot, plated with one ounce of silver per square foot.
6 OVERHEAD CRAWLS, complete with Norway Iron Hooks
2 4-WHEEL CRAWLS FOR CRUSHERS, with Norway Hooks.
420 LINEAL FEET ¼ x 1½ TRACK.
6 1-TON DIFFERENTIAL CHAIN BLOCKS.
2 3-TON BLOCKS FOR CRUSHERS.
47 UNION IMPROVED 4′ VANNER CONCENTRATORS, complete in every particular. (29 never used.)
2 AMALGAM CLEAN-UP BARRELS, 28 x 36.
1 AMALGAM CLEAN-UP BARREL, 20 x 30, complete with tight and loose pulleys.
3 4′ SWINGING BATTEAS and all fittings complete.
1 CAST IRON WASH TANK for clean-up work, 48 x 30 x 16.
1 HORIZONTAL 12″ GOLD RETORT with all iron work complete.
1 SET OF IRON WORK FOR BULLION MELTING FURNACE.
1 MAIN DRIVING PULLEY, 78 x 23½.
2 MAIN ROPE DRIVE WHEELS, 168″, grooved for five 1½″ ropes.
1 LOT, being all necessary shafting, hangers, pulleys, belting, etc., for mill.
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1 RAND DRILL COMPANY'S COMPRESSOR, 16 x 22, Class D, duplex (never used).
1 RANKIN & FRITSCH 16 x 42 CORLISS ENGINE.
1 HORIZONTAL RETURN TUBULAR BOILER, 75 H. P.
1 3-PHASE ALTERNATING CURRENT GENERATOR, 500 K. W., 60 cycle with 24 poles, type A. P., volts full load 2400, A. M. P. 120, revolutions 300, with rheostat.
1 ELECTRIC GENERATOR OR EXCITER, 12½ K. W. Multipolar Direct Current Exciter, type M. P., class 4-12.5-12.75, volts 125, with rheostat.
1 MARBLE GENERATOR SWITCHBOARD PANEL, 30″ x 90″ x 2″, containing one general field rheostat, one exciter field rheostat, one station transformer, one potential indicator, one current indicator, one pilot lamp, one ground detector with plug and receptacle, 3 type L lightning arresters, 6 feeder fuse blocks, one double pole exciter switch, two single pole switch brake 2000-volt switches, iron angle frame.
3 3-PHASE INDUCTION MOTORS, type "I," class 12-150-600, form "A," H. P. 150, cycle 60, volts 2080.
2 3-PHASE INDUCTION MOTORS, type "I," class 8-30-900, form "A," H. P. 30, cycle 60, volts 220.
1 3-PHASE INDUCTION MOTOR, type "I," class 10-50-720, form "B," H. P. 50, cycle 60, volts 2080.
100,000 FEET NO. 2 B. & S. COPPER WIRE.
1 LARGE LOT OF ELECTRICAL FIXTURES AND FITTINGS.
2 PELTON WATER WHEELS, 350 H. P. each.

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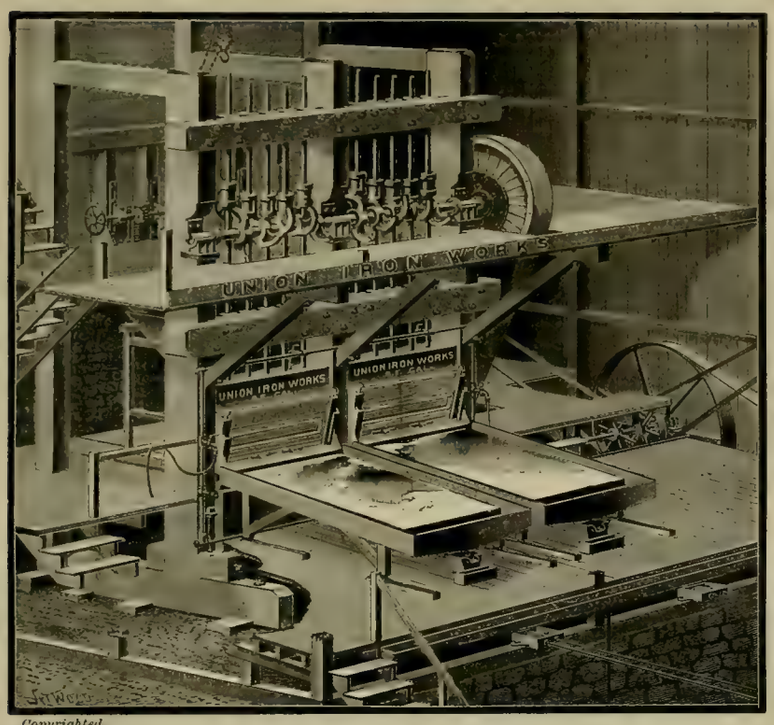
MODERN TEN-STAMP BATTERY.



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The illustration shows the details of a modern 10-stamp battery of the back-knee type, driven by belt and tightener from a shaft located upon the battery frame sills below the mortars and plainly illustrates not only the battery and its various parts, but also shows the ore-bin gate, feeders, copper apron plates and water piping, all in their relative positions.

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50-Horse Power Traction Engine.

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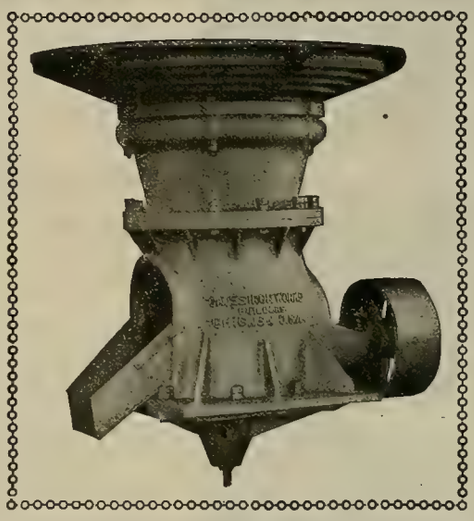

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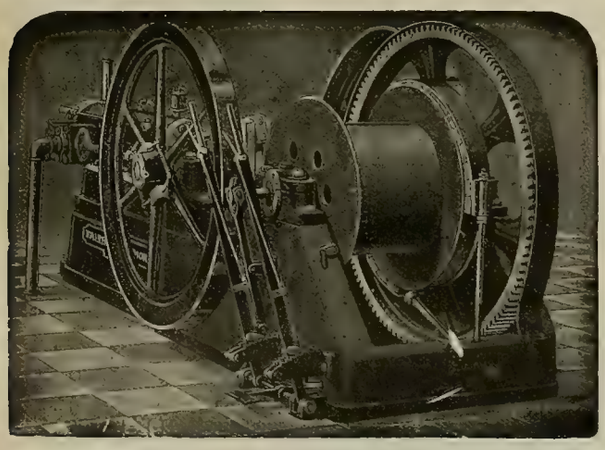

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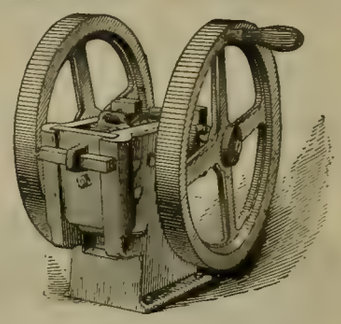

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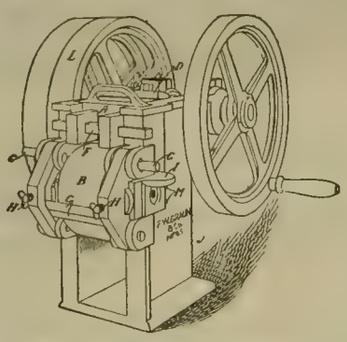

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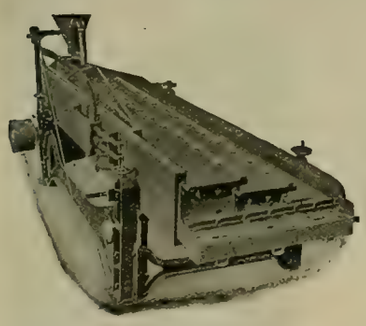

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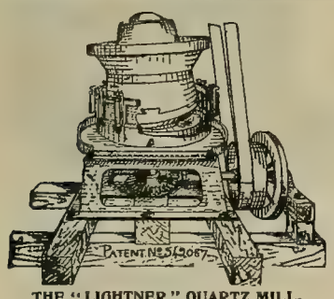

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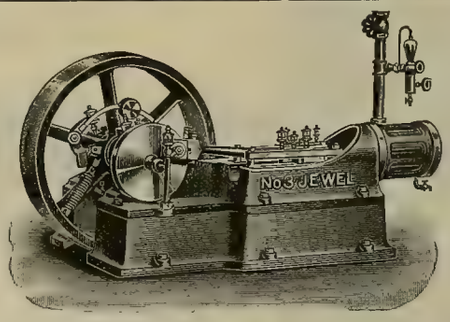

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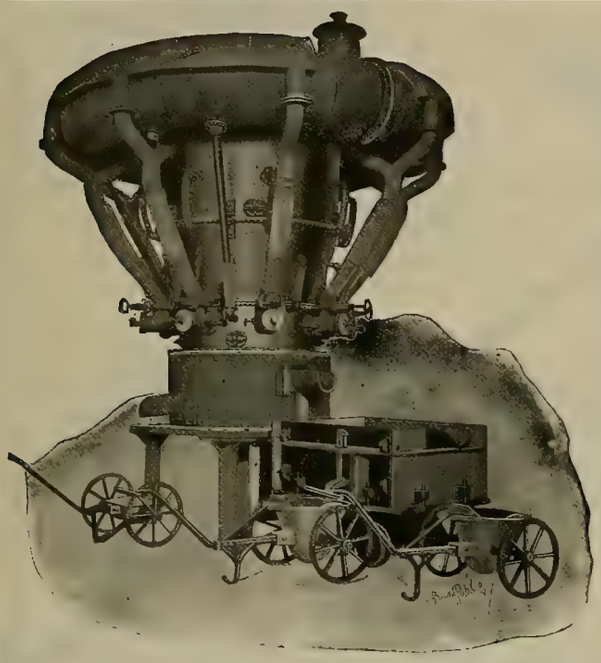

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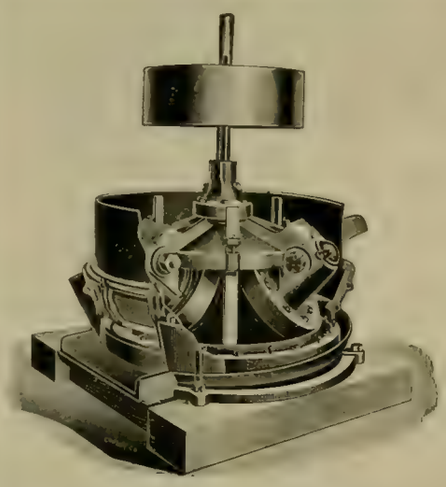

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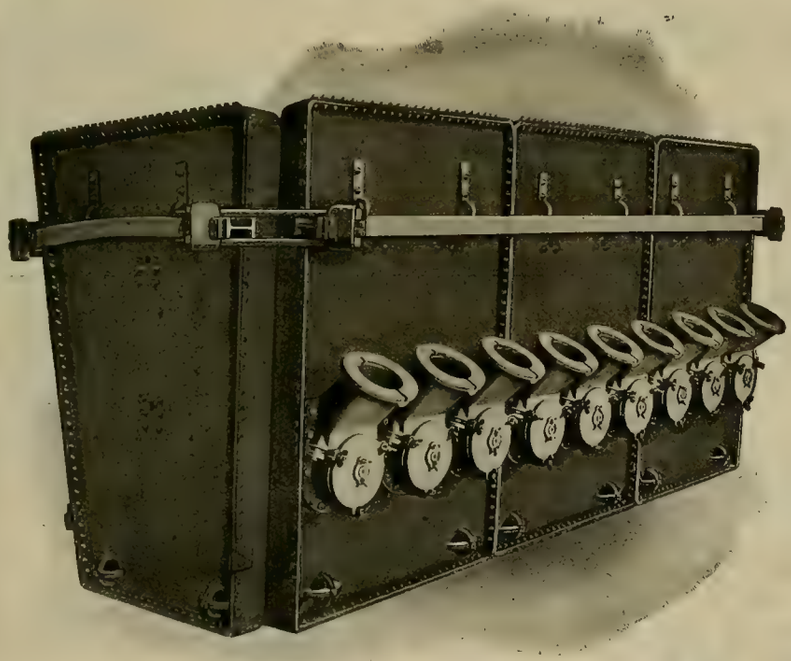

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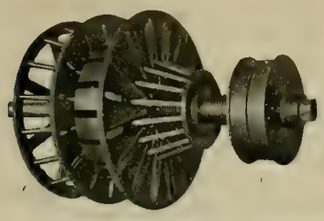

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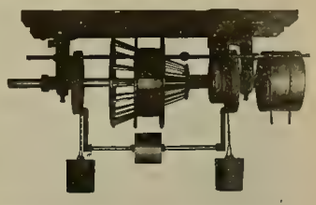

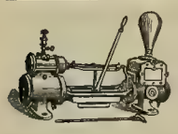

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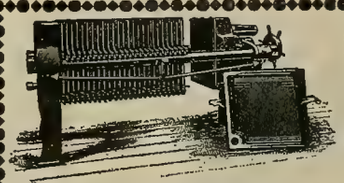

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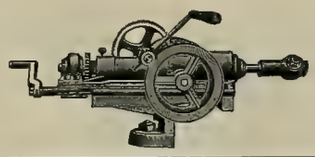

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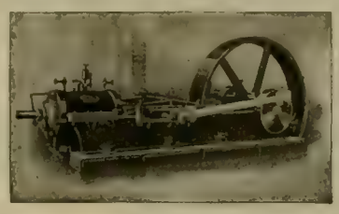

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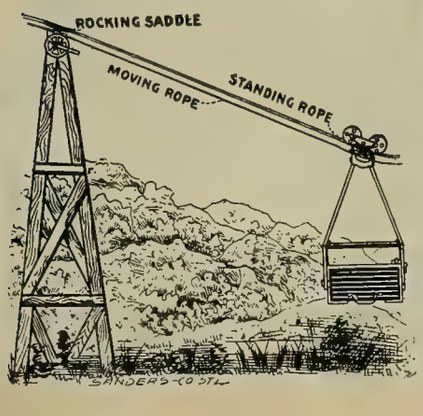

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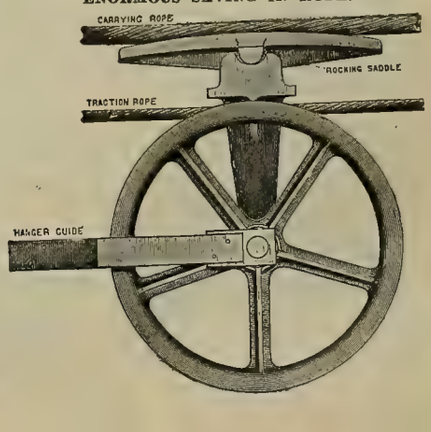

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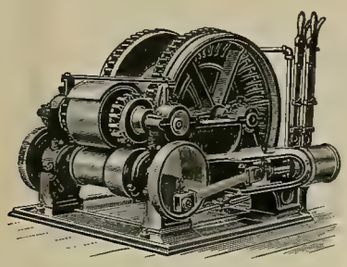

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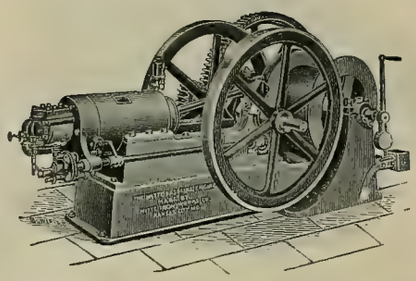

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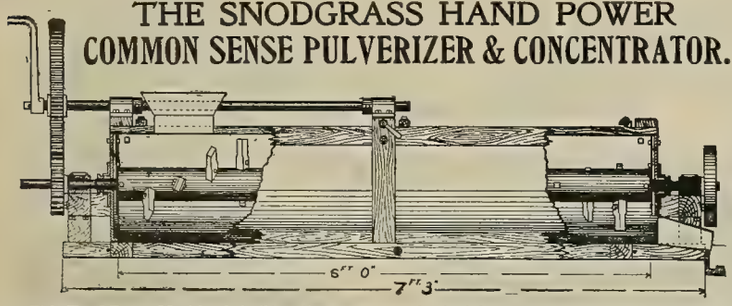

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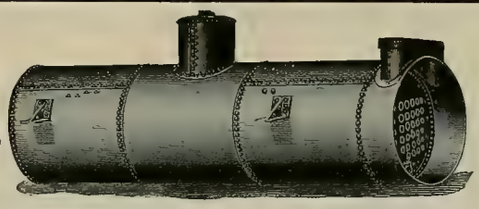

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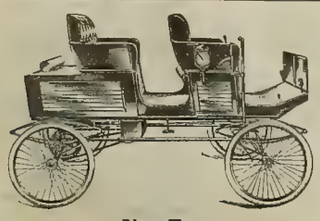

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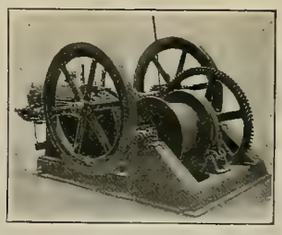

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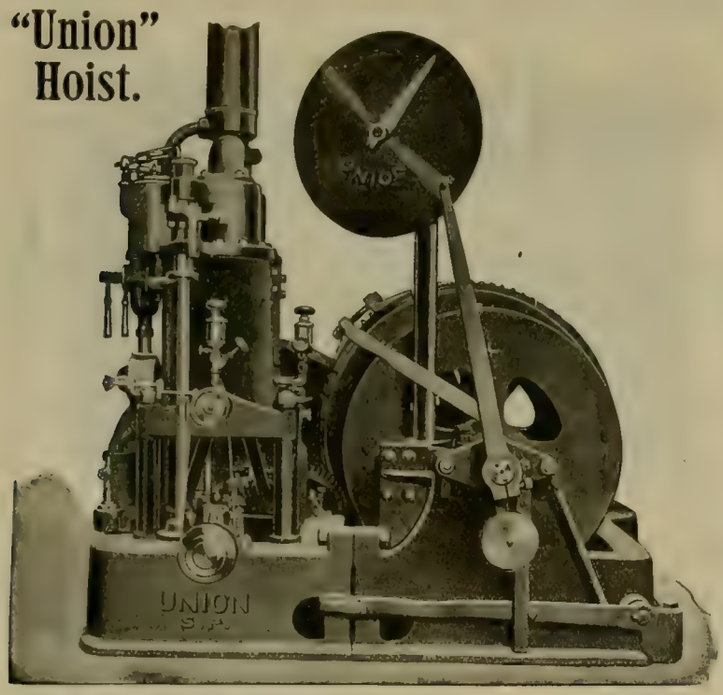

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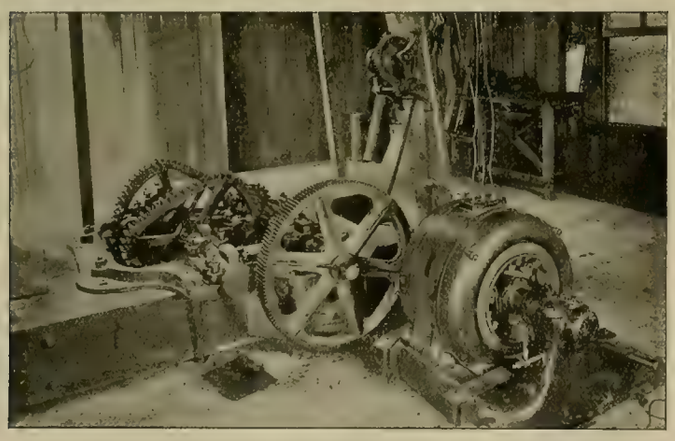

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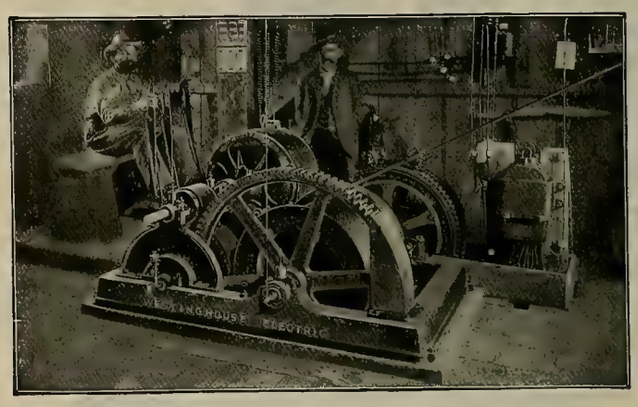

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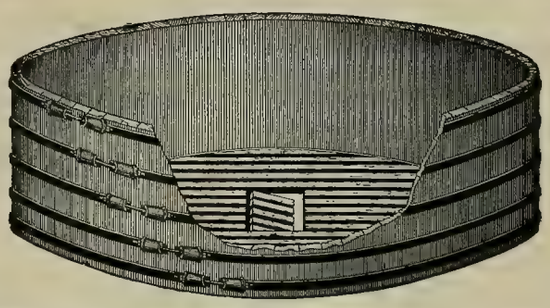

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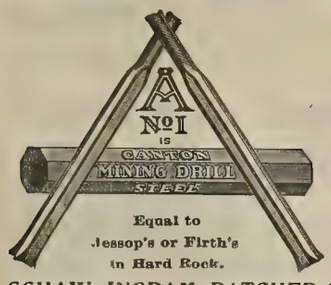

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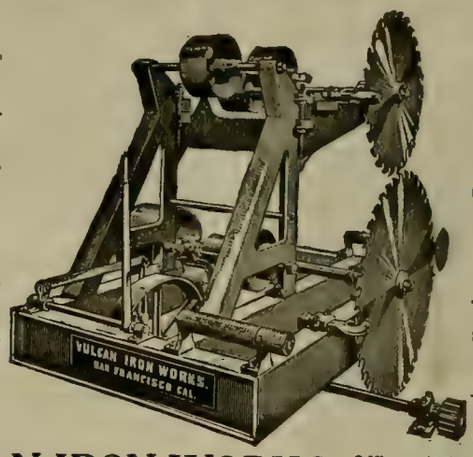

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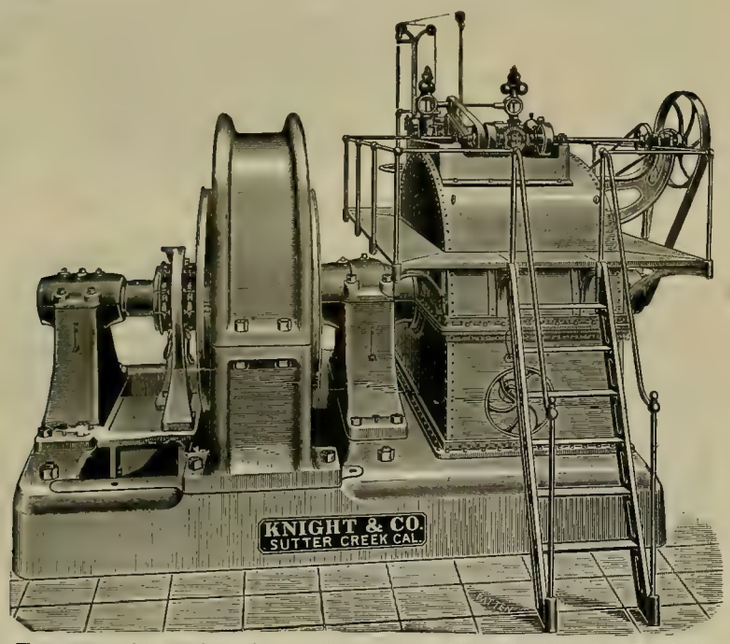

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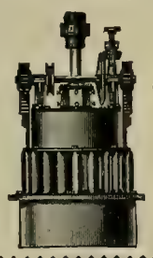

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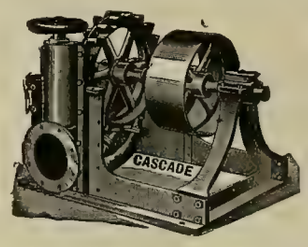

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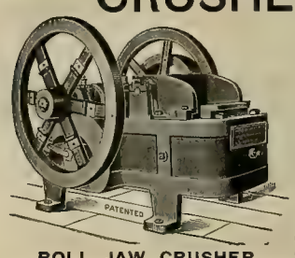

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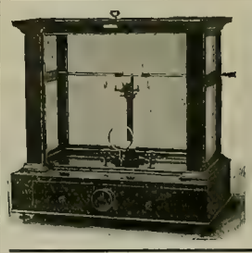

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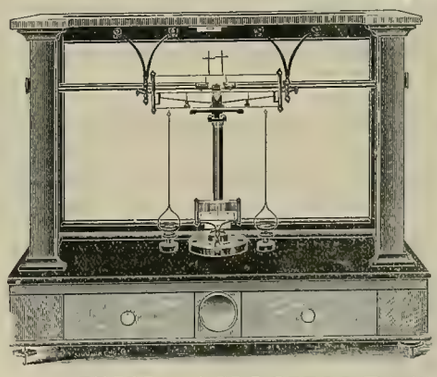

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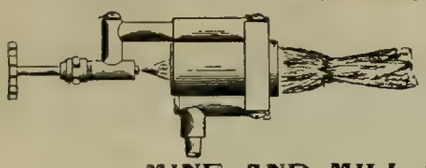

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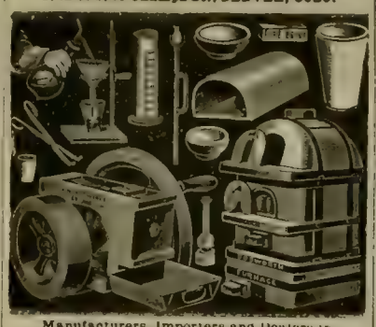

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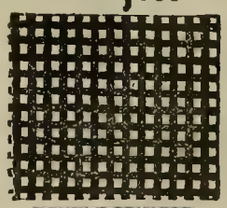

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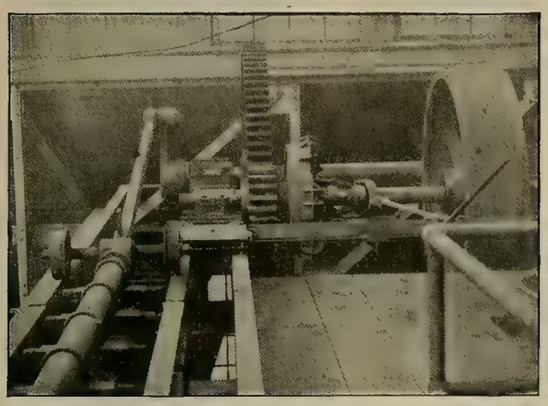

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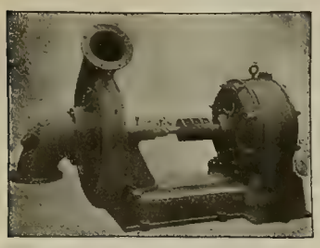

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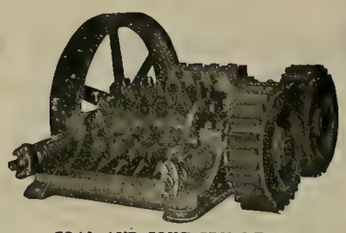

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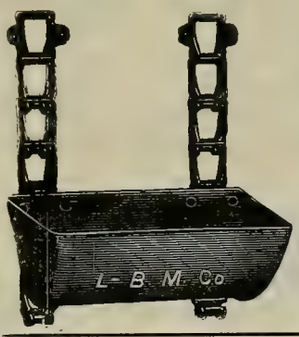

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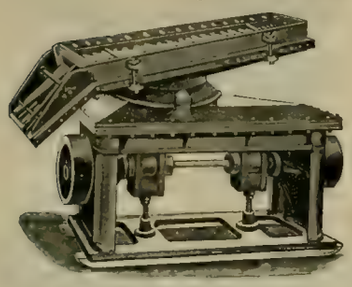

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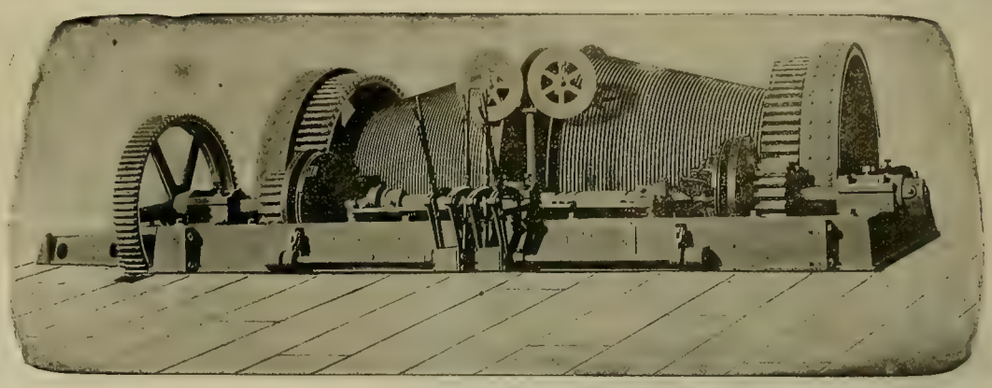

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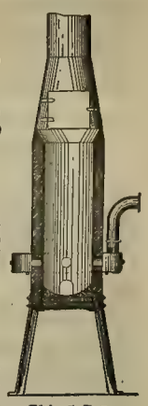

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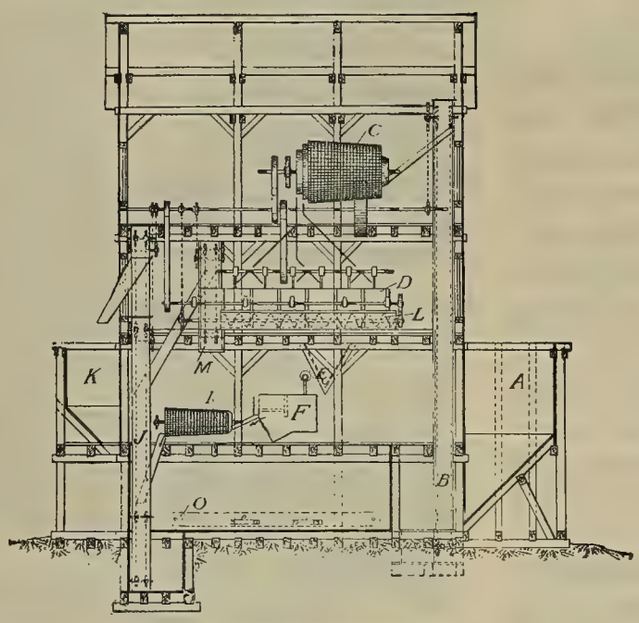

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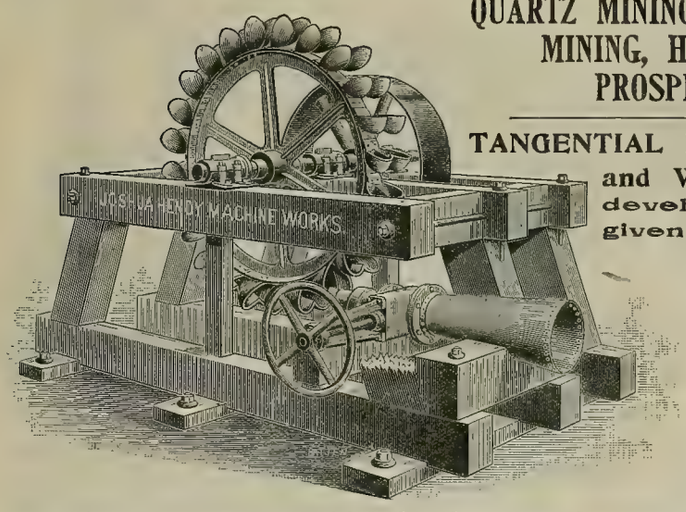

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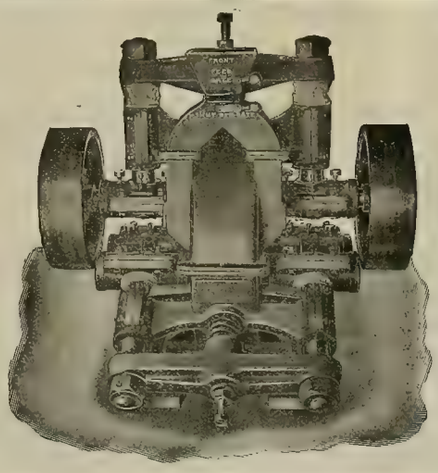

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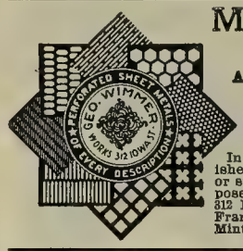

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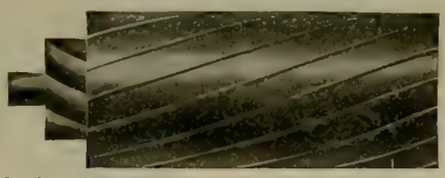

Note the smooth surface also.

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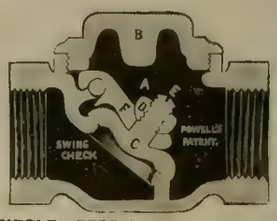

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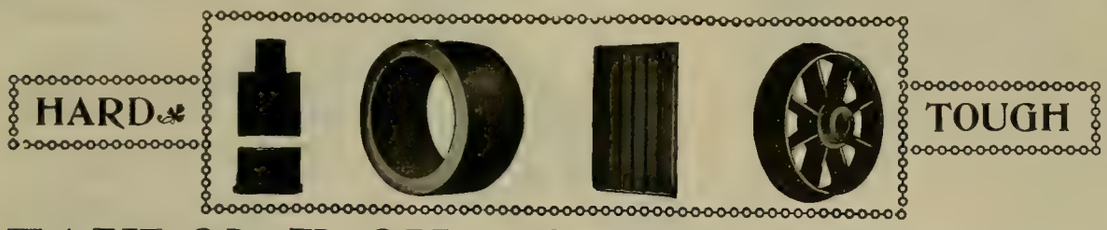

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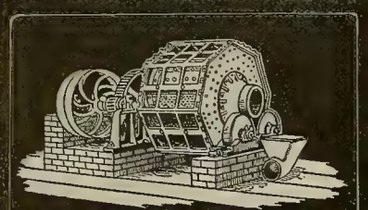

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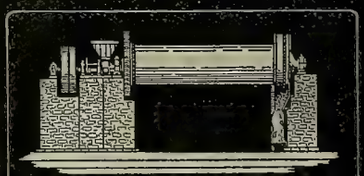

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225

ASSESSMENT NOTICES.

MOHICAN MINING AND MILLING COMPANY.—Location of principal place of business, San Francisco, California; location of works, Tuolumne County, California.

Notice is hereby given, that at a meeting of the Board of Directors, held on the 16th day of May, 1901, an assessment (No. 1) of ten (10) cents per share was levied upon the capital stock of the corporation, payable immediately in United States gold coin, to the secretary, at the office of the company, 300 California St., San Francisco, California.

Any stock upon which this assessment shall remain unpaid on the 15th day of July, 1901, will be delinquent, and advertised for sale at public auction; and unless payment is made before, will be sold on WEDNESDAY, the 14th day of August, 1901, to pay the delinquent assessment, together with the costs of advertising and expenses of sale.

By order of the Board of Directors.

JNO. W. CLASSEN, Secretary.

Office—300 California St., San Francisco, California.

EUREKA CONSOLIDATED DRIFT MINING COMPANY.—Location of principal place of business, San Francisco, California; location of works, Placer County, California.

Notice is hereby given, that at a meeting of the Board of Directors, held on the 25th day of April, 1901, an assessment (No. 30) of one (1) cent per share was levied upon the capital stock of the corporation, payable immediately in United States gold coin, to the secretary, at the office of the company, 214 Pine street, room 31, San Francisco, California.

Any stock upon which this assessment shall remain unpaid on the 28th day of May, 1901, will be delinquent and advertised for sale at public auction; and unless payment is made before, will be sold on TUESDAY, the 18th day of June, 1901, to pay the delinquent assessment, together with the costs of advertising and expenses of sale.

By order of the Board of Directors.

GEO. W. DIXON, Secretary.

Office—214 Pine street, room 31, San Francisco, California.

NATIONAL CONS. MINING COMPANY.—Location of principal place of business, San Francisco, California; location of works, Rich Gulch, Shasta County, California.

Notice is hereby given, that at a meeting of the Board of Directors, held on the 16th day of April, 1901, an assessment (No. 14) of five (5) cents per share was levied upon the capital stock of the corporation, payable immediately in United States gold coin to the secretary, at the office of the company, 773 Mission St., San Francisco, California.

Any stock upon which this assessment shall remain unpaid on the 1st day of June, 1901, will be delinquent, and advertised for sale at public auction; and unless payment is made before, will be sold on TUESDAY, the 25th day of June, 1901, to pay the delinquent assessment, together with the costs of advertising and expenses of sale.

By order of the Board of Directors.

GEO. W. FLEISSNER, Secretary.

Office—773 Mission St., San Francisco, California.

OSCEOLA CONSOLIDATED MINING COMPANY.—Location of principal place of business, San Francisco, California; location of works, Plymouth, Amador County, California.

Notice is hereby given, that at a meeting of the Board of Directors, held on the 23d day of April, 1901, an assessment (No. 11) of one (1) cent per share was levied upon the capital stock of the corporation, payable immediately in United States gold coin, to the secretary, at the office of the company, 307 Montgomery street, San Francisco, California.

Any stock upon which this assessment shall remain unpaid on the 25th day of May, 1901, will be delinquent, and advertised for sale at public auction; and unless payment is made before, will be sold on MONDAY, the 17th day of June, 1901, to pay the delinquent assessment, together with the costs of advertising and expenses of sale.

By order of the Board of Directors.

HOLLAND SMITH, Secretary.

Office—307 Montgomery street, San Francisco, California.

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Extremely Rich Mining Country.

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DELINQUENT SALE NOTICE.

SOUTH SLIGER GOLD MINING COMPANY.—Location of principal place of business, San Francisco, California; location of works, El Dorado County, California.

Notice.—There are delinquent upon the following described stock, on account of assessment (No. 1) levied on the 25th day of March, 1901, the several amounts set opposite the names of the respective shareholders, as follows:

Names.	No. Cert.	No. Shares.	Amt.
V. W. Crysler	6	160	$3 20
W. P. Keeney	7	500	10 00
W. P. Keeney	8	500	10 00
W. P. Keeney	9	100	2 00
C. W. Keeney, Trustee	13	200	4 00
C. W. Keeney, Trustee	14	200	4 00
C. W. Keeney, Trustee	15	1,000	20 00
Fred. Lass	19	1 000	20 00
Fred. Lass	20	4,000	80 00
E. W. Newth	22	500	10 00
F. W. Keeney	23	400	8 00
T. F. Keys	24	500	10 00
D. K. B. Sellers	25	500	10 00
Fred. Lass	29	1,340	26 80
L. Ariani	31	250	5 00
V. Ariani	32	250	5 00
W. A. Mitchell	35	1,000	20 00
A. C. Baumgartner	38	500	10 00
W. A. Mitchell	42	2,000	40 00
Fred. Lass	43	500	10 00
Ira D. Orton and L. A. Maison	44	500	10 00
Ira D Orton and L A Maison	45	500	10 00
R. E. Starr	52	500	10 00
W. A. Mitchell	53	1,000	20 00
Fred. Lass	54	1,000	20 00
Fred. Lass	57	1,000	20 00
A. C. Baumgartner	58	1 000	20 00
A. W. Mitchell	59	1 000	20 00
Fred. Lass	61	1 000	20 00
C. W. Keeney	62	200	4 00
C. W. Keeney	63	200	4 00
C. W. Keeney	64	4,000	80 00
C. W. Keeney	65	2 000	40 00
R. W. Bender	66	2,000	40 00
L. Ariani	67	160	3 20
A. F. Baumgartner	71	400	8 00
W. A. Mitchell	72	500	10 00
W. A. Mitchell	73	500	10 00
J. C. Donnelly	76	1,000	20 00
C. W. Keeney	77	2,000	40 00
R. W. Bender	78	1 000	20 00
Jas. A. Kerr	79	1,000	20 00
A. F. Baumgartner	80	5,000	100 00
G. A. Conro	81	2,000	40 00
C. W. Keeney	82	76,100	1522 00

And in accordance with law, and an order from the Board of Directors, made on the 25th day of March, 1901, so many shares of each parcel of such stock as may be necessary, will be sold at public auction at the office of the company, Room 8, 402 Front street, San Francisco, California, on MONDAY, the 27th day of May, 1901, at the hour of 12 o'clock M. of said day, to pay said delinquent assessment thereon, together with costs of advertising and expenses of sale.

J. L. DANIELS, Secretary.

Office—Room 8, 402 Front street, San Francisco, California.

POSTPONEMENT.

The date of sale of the foregoing delinquent stock has been postponed from May 27th, 1901, to MONDAY, the 3d of June, 1901.

By order of the Board of Directors.

J. L. DANIELS, Secretary.

Office—Room 8, 402 Front street, San Francisco, California.

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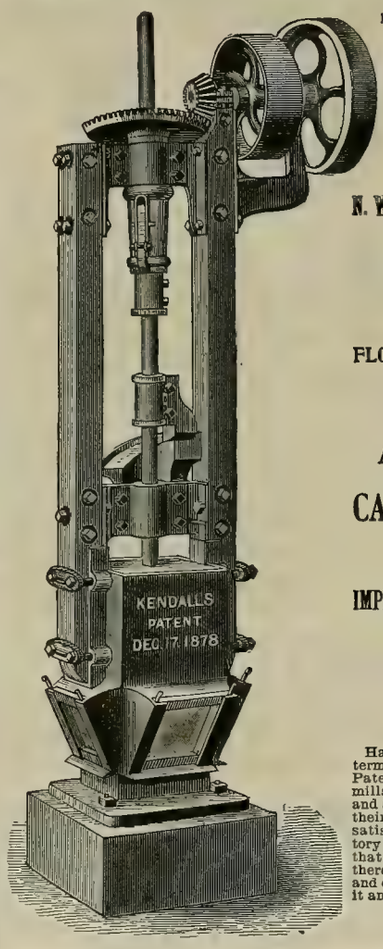

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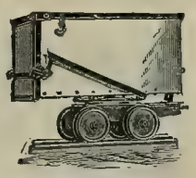
COST NO MORE THAN COMMON CARS.



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We build these cars in a shop devoted exclusively to their manufacture, using the best quality of Steel and Malleable Iron, thus assuring strength and durability.

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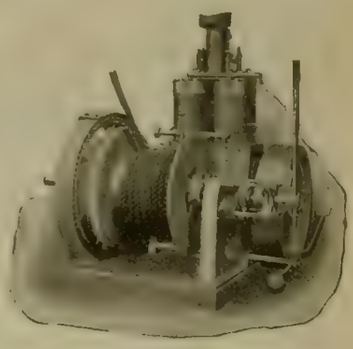

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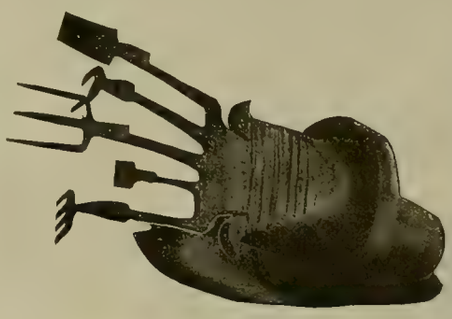

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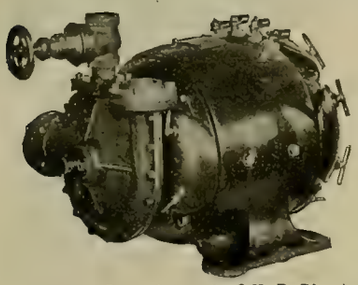

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can be readily shifted to any part of the mine without expense or delay, and can be controlled by an operator placed in the most advantageous position.

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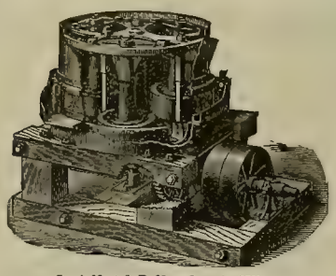

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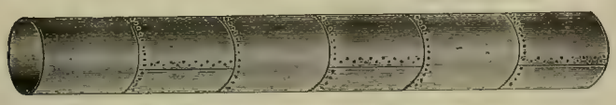

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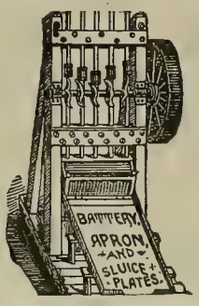

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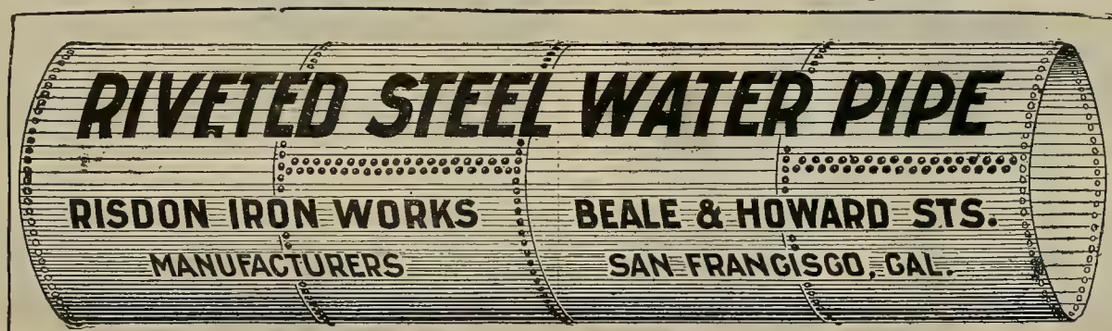

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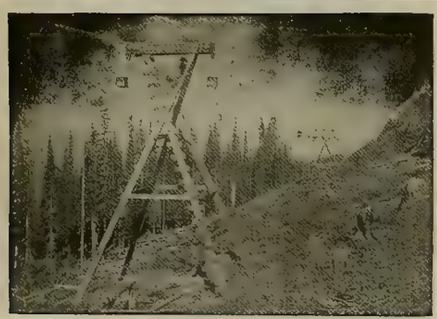

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MINING AND SCIENTIFIC PRESS.

Whole No. 2132.—VOLUME LXXXII. Number 22. SAN FRANCISCO, SATURDAY, JUNE 1, 1901. THREE DOLLARS PER ANNUM. Single Copies, Ten Cents.

The Silver King Mill, Utah.

The Silver King mill at Park City, Utah, is a fine example of modern mill construction. It has operated continuously since its completion, making a jig product that runs about 55% lead and a table concentrate that runs 45% lead. Five grades of jig product are made. The vanner room contains six Frues and six Wilfleys. The general mechanism of the mill was described in this paper in March, 1900. Since then a new feature has been devised and put into practice for saving values from the finest class of slimes. It consists of eight triangular settling tanks, each 5 feet high by 60 feet long, which receive the slime water from the jigs and tables, the fine particles settling at the bottom, from which they pass into slime presses, where the material is submitted to eighty pounds per square inch of compressed air. After the pressure is through with, the slime product is taken from the presses in the form of circular slabs, which are absolutely free from grit, and which carry high values in gold, silver and lead that a few hours before floated in suspension in water. In April a shipment of 225 tons of this product was made. It is claimed the values thus saved from the slimes amount to enough to pay all expenses of operating the entire mill.

The mill receives and treats 70 tons of ore per day, about 125 tons per day being shipped to the smelter direct. Most of the ore is a carbonate, with bunches of galena in places. Recent shipments from the 1200-foot level ran high in gold, silver and copper.

Near the mill is a new sampling plant, provided with automatic equipment throughout. It has four receiving bins, 250 tons capacity each. There are three sets of rolls—36x12, 30x10 and 24x8 inches; also four samplers. Five steel-legged elevators carry the ore after sampling to the shipping bins. The crude ore passes through chutes from the receiving bins to Robins conveyors, the latter delivering it to the crushers.

A new Finlayson wire rope tramway line, furnished by the Mine & Smelter Supply Co., has been erected to convey the ore from the sampler to the shipping bins at the railway in Park City. It is 7000 feet long, erected on steel towers, the line carrying buckets of 750 pounds capacity each. The mill and sampler are under the superintendency of J. B. Fleming, who planned their construction.

The Silver King Concentrating Mill, Park City, Utah.

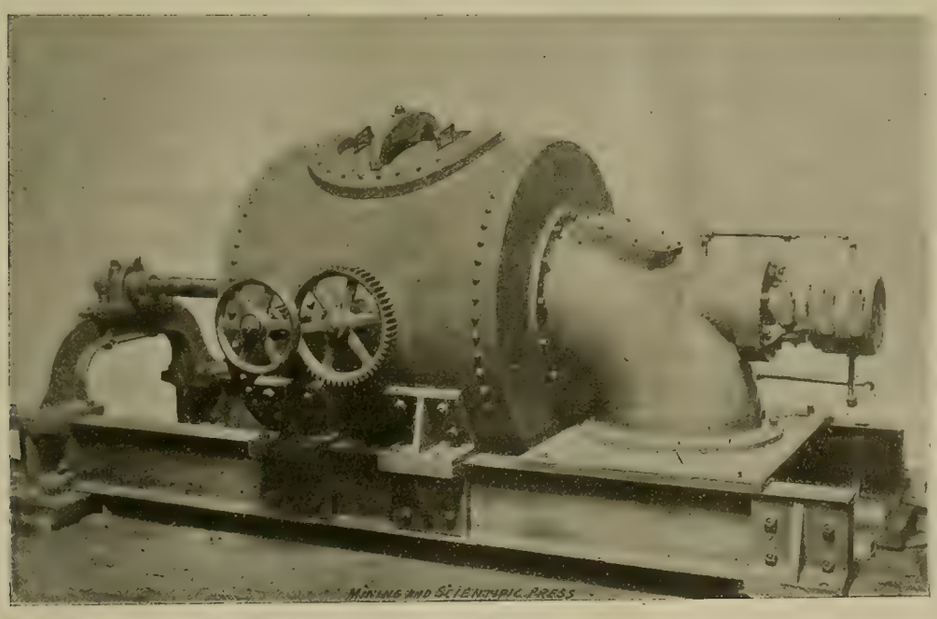
Turbine Water Wheels for McCloud River, Cal., Power.

Among the enterprises utilizing the power of the falling water of the mountain rivers in California is the McCloud River Electrical Company of San Francisco, which is developing a portion of the power available from the flow of the McCloud river, which has its source in the snows on the summit of Mount Shasta. The power developed it is proposed to transmit to the copper mines and smelters of Shasta county and to other mines and industries.

For the development of the water power the company is installing four units of Victor turbines, manufactured by the Stilwell, Bierce & Smith-Vaile Co., of Dayton, Ohio. These turbines (see illustration on this page) are equipped with "cylinder gate" mounted on horizontal shafts, each unit to develop 790 H. P. under 36′ working head of water and running 270 revolutions per minute. Each unit consists of two 30″ Victor turbines, mounted in a steel flume and discharging into one central-draft tube. The flumes are 15′ 9″ long, 9′ 6″ diameter, constructed of heavy steel plate with cast iron heads and covers. The gate work is the "patented draw-rod" type, which places all gears on the outside of the flume, where they can have attention and where they can work in oil, doing away with the old style of gate work where the gears run in water.

The wheels are set on top of concrete arches, the draft tubes reaching through to the tail water below. Each unit is equipped with a large rope pulley, and the dynamos are driven by means of rope drive, the dynamos being located at a higher elevation than the water wheels. The feeder pipes come through the foundations upon which the generators set.

There are two exciter water wheels (see illustration page 250) which will develop about 40 H. P. each under 36′ head, and the exciters are also driven by means of rope pulleys. The large units are each equipped with a Giesler electro-mechanical governor for regulating speed.



750 H. P. Turbine for McCloud River Electrical Co. of San Francisco, Cal.

MINING AND SCIENTIFIC PRESS.

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San Francisco, June 1, 1901.

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GOLD, of all products of man's industry and thrift, is apart from the rest as the one product that takes care of itself. It does not have to wait in a market for a buyer, it does not have to go in search of a market. It is its own buyer, its own market, and its market is where it is. It is always worth $20.67 an ounce for an ounce of it is always itself the $20.67.

DEARLY BOUGHT experience seems to have satisfied foreign capital that Siberia is a poor country for mine exploitation by others than Russians. Russia is perfectly willing to have the foreign capital, but only permits it in Russian companies, and reserves the control to Russians. The Government, mine owners and people have absurdly exaggerated ideas as to the value of their placers, are extravagant and incompetent in management, and burden the business with costs and royalties that make profit impossible, even with very rich ground. At the same time, Russians do very well with these same placers when mining on their own account. They are good prospectors, and confine their losses to prospecting, not mining any ground that will not pay extraction costs.

THE California State Mining Bureau has announced that registers and maps of mines of several counties are ready for distribution. The preparation of these publications was doubtless well intended, but the execution is a weak spot in the otherwise excellent record the Bureau has made of work valuable to the mining industry. The data was gathered in the field two years or more since under limitations, or, more truly, under no limitations, which makes its publication practically worthless from an economic standpoint. The text accompanying the register mainly says, in effect, that the data was gathered and published in such a manner as not to injure the repute of any mine; which is clearly quite true, and it is just as obvious that the data does not help the repute of any mine. The registers, however, are quite misleading to manufacturers and dealers in mining apparatus and supplies—the only people who could find the register useful. They do not know, and cannot be expected to know, the local peculiarities of California mining and mines, and will give to the lists of mines an importance entirely out of proportion to the facts. To that extent the publication is mischievous. The unpublished data of other counties should not be published. There are useful purposes to which the saving can be applied. There is ample field for the Bureau activities without doing over poorly what the U. S. Geologic Survey has already done very well.

The Line of Least Resistance.

It is at this writing two months since the California petroleum producers found themselves squarely up against the condition of a market in which there was more petroleum offered on sale than there was consumption to buy it. Sale prices then dropped so low that the future earnings of the business, which the oil company promoters had capitalized and sold to the public, apparently disappeared. Of the low sale price of oil, the fixed cost charge of railroad transportation was then by far the larger part of it. Immediately the producers appealed to the State Railroad Commissioners for lower freight rates. It seemed the quickest way to the mass of the producers by which to be able to have again the profits that low prices had caused to disappear. Instinctively it was taken by them as the line of least resistance. Nevertheless, the freight charges are undiminished and the sale price of oil is still low.

Later, other of the producers, appreciative of a weak point in the "instinct" action, and who grasped the simple, direct fact of the condition—more petroleum for sale than buyers for—met the simple, direct fact by an equally simple, direct action in the opposite direction. They proposed to reduce the amount offered for sale. They called it something else, but that was what their action meant. They have organized a producers' buying company which should take over all the well production and fix sale prices high enough to make a desired profit without restricting consumption. This action is believed to be the application of reason, in contradistinction to instinct, in securing the profit of the producer on the line of least resistance.

Here suggestion of action from the people of the industry rested. Nothing more has really been offered. Suggestions of pipe lines are only a modification of the first line of action—lowered freight costs.

Looking analytically at the first instinctive suggestion of lowered freight rates, it is seen in truth to be nothing but an attempt to pass the loss off on some one else. It was clearly inspired with the idea that what was taken off the freight would go into the profit of the producers. It is quite as good a try at the desired end as is the action of the ostrich who puts his head in a bush to hide from his pursuer. Suppose the freight rate be lowered, it does not increase consumption nor decrease delivery to the market. The producer whom it is desired to help is not helped, the consumer who does not ask lowered prices gets them. The railroad loses an earning without benefit to the people who ask it. And these results are quite independent of the existing freight rate. Evidently when reason is applied the instinctive action of the producers who would meet this particular condition by reducing freight rates is not on the true line of least resistance on which to obtain relief.

Examining analytically the second suggestion of applied reason it is seen to be a more reasonable attempt to cure the disease than that offered by instinct. The head of the house, instead of giving the cat the medicine for madam's illness, takes the medicine himself. The producers in organizing a trust, or community of interest—it is the same fact—to maintain the sale price at a profit point, are restricting production and denying to themselves all the possible profits their industry could legitimately earn. The individual producers sell to themselves associated all their oil product, but "all" must mean a maximum of the pro rata of the total consumption, not the maximum of their possible production. They must, supposing they do not limit their own production, prevent production by new comers in the industry. The essence of their kind of action through all the disguises of language is limitation of production—which limitation must be paid for by the producers in the aggregate either directly or indirectly, and which payment reduces the profits sought by the proposed action. This is on the theory that the limitation is financially carried by the producer. If it is not, it is inevitable that the present loss is only postponed, compounded, and made the loss of all the producers instead of the weaker only as under a continuation of present conditions.

Whatever then can be said of the courage and straight-forwardness of the producers in undertaking to carry the load of overproduction of petroleum, it is indefensible as business. The reason that promotes it is as weak in conclusion as is the instinct that wants for the same trouble a reduction in railroad freight rates. The line of least resistance is not in limiting production artificially.

Right here, where those newspaper advisors who have fattened on the growth of the oil industry, which the technical advice of this journal assisted into being, have quit, we would suggest:

Suppose now that since neither forcing the railroad to take the load of the loss of the petroleum business, nor restricting the production, will make profits, that the medicine be given to the third party, the consumer. This means simply that consumption be increased, so that demand is in surplus instead of supply. Suppose consumption to be increased, is not at once the lost profit restored independent of freight reductions or combinations of producers limiting production? The consumer has not from necessity demanded a lower price than that which existed before the drop. Consumption is not contingent on a lower price, and a lower price has not increased it. Mentally passing the seeming contradiction for a moment, it is safely to be stated as conclusive that increasing consumption of petroleum would increase the present sale price to the old figures without requiring reduction of freight charges or limiting production by forcing association of producers. Clearly the line of least resistance is, then, increasing consumption of petroleum.

That being determined, there is only to be ascertained the means of making increase. Increased consumption will come from more uses and more users. As suggested, the sale price has not been the difficulty here. It is really what may be described as the inertia of established business. What consumers actually buy when they buy coal or oil or gas is heat and light and power. The first three are raw materials, the latter three are directly consumable products. The consumer of the first three is really first a manufacturer of the last three, then their consumer. Take as the economic fact that heat, light and power can all be manufactured cheaper from oil than from coal (gas is really an intermediate stage between the coal or oil and the heat, light and power). Accept the commercial fact that despite the cheaper manufacture for oil, the inertia of the established business resists the change from coal as a raw material to oil. Then flank the commercial barrier by offering to the consumer direct what he himself has heretofore manufactured from the coal, heat, light and power. Particularly heat. Light and power as finished products sold are familiar to consumers and part of the market is occupied, but heat, probably the largest commercial use of the three, is the least sold directly.

Take the capital which the producers are concentrating in their association to use negatively, and use it positively to bring the same end. Use it to provide the means to convert oil into heat, light and power, the means to transport them as such to the consumer, and then sell to the consumer heat, light and power.

Do the manufacturing at the nearest point to the oil-producing wells. Sell in the nearest market or to the nearest consumers. The means of carriage for the heat, light and power is electricity. Such transmissions are commercially made in this State over 160 miles of distance between the points of manufacture and consumption. The distance limit of commercially economical transmission has not been reached yet. It is safe to assume that it exceeds 300 miles. This latter figure would connect the Bakersfield petroleum wells with San Francisco. There is no more physical or commercial difficulty incident to the manufacture and transmission, electrically, of heat, light and power from petroleum as the raw material than there is from falling water as the raw material.

Details are a matter for the engineers and petroleum producers. This is only intended as suggestion pointing out the true line of least resistance. Summarized, that suggestion to the oil producers is: Offer to consumers of heat, light and power not the raw material, oil, but heat, light and power direct. Make these last at the oil wells and distribute from there by electricity. Induce particularly the direct use of heat in electrical heating devices for domestic

service. The direct use of petroleum in domestic stoves and furnaces would increase consumption, but it is a much less safe and simple affair to the consumer than pressing a button.

The conservation of the energy of fuel into electricity at the point of production of the fuel is not new. It has been proposed for the English coal mines. It has been proposed for using peat bogs in Germany. The business reasons that made the propositions possible there make the proposition of conserving the petroleum here into electricity possible. The inertia of an established business in this country is a trifle to what it is in England and Germany.

Let effort to make profit be initiated on this line and it is possible to have the financial union of all the producers of petroleum behind it, and as well the assistance of others who hope to produce petroleum. The manufacturers and dealers in electrical supplies and appliances would join in it. There would be no business interest that would financially oppose it. To so increase consumption is the line of least resistance for the oil producer.

The Old California Way.

The mischievous litigation which has accompanied the discovery of gold in the Nome district of Alaska is again prominent in the pardoning of McKenzie, the Receiver of the U. S. Court at Nome, around whose personality the major part of the difficulty originated. The law has been vindicated—but at the loss of much time and at the cost of much of the profit of the mining of the gold in the claims.

John T. Davis, in his History of the Mining Laws of California, quotes some old records of early day mining law in California that illustrate that all the economics of mining are not the invention of the last few years. The beginners in mining seem to have known how to economize time and save legal expenses. Mr. Davis says:

One of the most instructive records of miners' meetings is that of the meeting held Dec. 13, 1853, in the Weaverville district, in Trinity county:

Dr. Ware explained the object of the meeting in a few pertinent remarks. He said that McDermot told him on yesterday that unless he gave up one-half of the water in the creek aforesaid, that he, McDermot, would take a body of men and take the water by force of arms and hold the same until he and his men were whipped off the ground. His party as above mentioned have taken possession of the water, and are holding it by force of arms. In this dilemma Dr. Ware calls upon his fellow miners to assist him in defending his rights, agreeable to the old miners' laws. They said that this was a serious affair, but they were willing to defend the old and established miners' laws and the right.

A committee of five was appointed to investigate the nature of the grievance and examine the law on the subject, and a recess taken. The minutes then proceed:

Pursuant to adjournment meeting met at 1 o'clock, were called to order by the chairman, Mr. Cameron. Committee reported as follows, having thoroughly investigated the laws and customs of the miners at Weaver: We fully concur in the opinion that Dr. Ware is fully entitled to all the water in West Weaver, except four tom-heads, which is allowed for the bed of the stream; also that the burning of his reservoir, and the destruction of his dam and other property and the taking of his water from his race by force of arms are malicious acts, and should not be submitted to by those who are in favor of law and order.

On motion, the report was received and the committee discharged.

On motion, it was "Resolved, that we assist Dr. Ware in turning the water into his race, and that we sustain him to the last extremity in keeping it in the race."

On motion, the meeting then adjourned for the purpose of carrying this resolution into effect.

WITH the restoration of stable industrial and governmental conditions in the far East, Corea is attracting attention for gold mining, both placer and quartz. Many Californian miners are going there under contract. The opportunities for capital and the chances that it will be permitted to earn mining profits are better in that land than in Siberia. There is practically no governmental regulation. Royalties are collected by the local mandarins and are not high. Corean labor is physically more efficient, and more tractable, than either the Siberian or Japanese. The mining area of the country is the central interior plateau, and the northern end adjoining Manchuria and the Siberian province of South Ussuri. The climate is about that of Maine and Nova Scotia. Transportation facilities are still backward, but improving. Gold exports in 1897 were about $4,000,000.

Concentrates.

PITTSBURG REDUCTION CO., Niagara Falls, N. Y., are buyers of aluminum ores.

JAPANESE gold placers in 1900 yielded about $600,000. The copper production was 27,840 tons, being the third largest in the world.

THE majority of cam shafts are made of wrought iron. The practice of makers differs. Steel, being cheaper, is frequently used for these shafts.

TROLLEY FREIGHT CARS are coming into use all over the United States and are proving a great convenience in expediting the delivery of local freight and express packages.

A FLUME made of rough boards 10 inches wide in the bottom, 8 inches depth of water on sides, with 1 inch fall to 12 feet, will deliver 2.2 cubic feet per second, or 88 miners' inches.

THE new law increasing the extent of a placer mining location in Atlin district, B. C., goes into effect about July 1st of this year. It permits the location of claims 250 feet square.

THE placer gold taken out of the beach diggings at Yukatat and Lituyu bays on the Alaskan coast is very probably due to the wave and tidal concentration of poor glacial deposits.

TOO great heat in retorting will soften the iron of the retort and some fusion of its inner surface in contact with the bullion will cause it to receive a considerable impregnation of the latter.

THERE is no definite distance above the surface of the water in a mortar from which the drop of the stamp creates a splash which wears the chuck block. The narrower the battery the less the distance must be.

RETORTING will destroy most of the grease fouling quicksilver. It is better to distill over the last tenth of the metal separate from the rest. A washing with lye will remove grease from quicksilver on battery plates.

AT the Robinson mine in the Transvaal the cost of crushing the ore in the rock breakers is 13.5 cents, the stamp milling costs 57.5 cents, the concentrating 9.5 cents, and the cyaniding 72 cents, a total of $1.525 a ton.

THE law passed by the last California Legislature raising the incorporation fees cannot be avoided by incorporating outside of the State, foreign organized incorporations must pay the same fees when they undertake to do business in the State as if they had incorporated there.

THE outlet to a reservoir should preferably be a tunnel through the solid ground alongside of the dam. A trunk through a dam is poor practice. It is hard to protect it against leaking and against the weight and more or less uneven settling of the dam when it is built of earth.

THE best way to keep a mine pump operated by compressed air from freezing is to reheat the compressed air in the mine close to the pump. Not only will the difficulty of freezing be removed but there will be a large gain in efficiency. The reheating is comparatively inexpensive.

IN a method of welding copper lately described the copper is treated with potassium nitrate and a cyanide, after which it is welded to itself or to iron or steel in the same way that iron is welded in a blacksmith forge. The temperature of the copper wants to be considerably below a white heat.

THE Commissioner of the Land Office has recently made a decision in a land case in Washington reaffirming the principle on which the Secretary's decision in the oil land cases in California was made. Land must be vacant unoccupied land to permit of its being made a lieu land selection.

STEEL has a tendency to assume the crystalline state under vibration sooner than wrought iron, but not as soon as cast iron. The crystallization of the carbide of iron present in steel and cast iron seems intimately connected with the phenomenon of crystallization. Cast iron has more of this than steel.

THE secret of the cheapness of American manufacturers is claimed to be, partly at least, in the interchangeability of parts of every mechanism, in the standardizing of constructions. A mechanical invention in this age is not complete till the machine tools to make it in interchangeable parts have been invented.

GOLD in lode deposits is very often found coated with iron oxide so as to be unamalgamatable. This is the case where the coating is only a transparent film. Break it at only one point and the gold will amalgamate. The rubbing and grinding machine employed in early day gold quartz milling were devised to meet this condition then supposed to be all but universal.

A DECISION of the United States Supreme Court just made in a Cripple Creek, Colo., case, the Calhoun M. Co. against the Ajax M. Co., can be considered as finally establishing the principle that the ownership of all lodes or veins apexing within a legally established mining claim belong to that claim irrespective as to whether they are cross or parallel veins. Between two conflicting locations the senior in time takes all the veins apexing within the conflicting area.

IMPROVEMENTS in methods and machines effecting magnetic concentration have extended the number of ores and minerals it can be applied to. In addition to the separation of iron ores from gangue and between themselves, compounds of titanium, tungsten, nickel, cobalt, manganese, copper, lead, silver and tin ores and some sulphide of zinc and bismuth compounds can be separated.

THE solution commonly used in silver plating is nitrate of silver prepared by taking four parts of the strongest nitric acid with one part of water and adding pure silver till no more is dissolved. The solution should be kept in a dark place. Cyanide of gold is used in solution in gold plating. The gilding of the inside of a silver vessel is done by filling the vessel with the solution and suspending it in a gold anode.

THE mining laws do not require an annual expenditure or assessment work on a mill site location. A mere claim without mill improvements would not, however, be valid as against a mill site claimant who did actually construct a mill. With a mill once on a mill site possession can be maintained even if the mill is not operated. One of the California courts has decided that the payment of taxes is vital evidence of possession.

EXPERIENCE in sub-aqueous tunneling goes to show that the principal dangers of water lie in the approach tunnels under the land, and not in the portion under the bed of the water channel. In the former the crevices and fissures remain open, those above the level of low water being water channels, while crevices in the sea bottom have for ages been gradually sealed up by sea deposits under heavy pressure, which would drive out air and water and tend to the calking of all joints.

THE most accurate method of determining the quantity of water that will be contained in a reservoir made by damming a valley is to survey the water level contour lines of the land within the reservoir site. The contours surveyed can be for successive intervals of depth over the outlet 3 or 5 feet apart. These should be platted and unsurveyed contours interpolated by proportion to make 1 foot differences of level. The successive areas can be calculated in square feet, using a planimeter. The sum of these successive areas will be the content capacity in cubic feet. A roughly approximate estimate can be made by determining from a survey of the contour of the highest proposed water level the full floodable area in square feet and multiplying it by two-fifths of the maximum depth over discharge.

WITH shallow surface developments on a lode deposit it is rarely good judgment to run a long costly tunnel to cut the lode at a great depth. The Mexican miner's way, though not pretty, is generally satisfactory in returns. His method is to follow the ore values with his mine openings, turning his shaft or winze or tunnel as the ore body changes its direction. With shallow surface developments there is nothing certain on which to predicate the direction or the continuity of an ore shoot developed by a surface cut or shallow incline. It is much safer to gain depth by successive steps. Just how much at a time is a matter for judgment in the particular case, but it is safe to say that 200 feet is ordinarily an outside figure for the first gain in depth sought by a tunnel. As the direction and continuity develop, greater depths may be taken by successive tunnels without increasing the chances against success. To tunnel to cut a lode a thousand feet below surface works only fifty or so feet deep reads nice, but it is not mining.

PLACER mining dredging is not precisely the same operation either technically or commercially as dredging navigable waters. In dredging gold-bearing gravel the removal of the material is a secondary object to the winning of gold. If the ground is in places too hard to repay from its probable gold content the cost of taking it out it is left in place. No fixed depth and width have to be dredged as is the case with dredging of navigable waters. The deposit of the spoil is to greater distances requiring auxiliary plant and labor in the case of the navigable water dredging. With the latter commercially the profit earning has to be provided for and the element of risk discounted in advance and special conditions of each piece of work modify contract prices. There is nothing inconsistent in the flat operative cost of placer mining dredging being 12 cents a cubic yard and a contract bid of 20 cents per cubic yard for dredger excavation in navigable waters. It is very doubtful if placer dredging has been done for 2 cents a cubic yard; 5 cents would be a very satisfactory result.

FEW diamond drill bores go down in a perfectly true vertical course. There are usually several slight bends or curves away from a straight line, and if the boring is through highly inclined strata the deflection may carry the end of the hole 50 feet or more away from the vertical line. A method of determining the extent and place of this deflection has been invented in Australia. The instrument, which the inventor calls the clinograph, consists of a number of clear glass phials nearly filled with a hot solution of gelatine, each containing suspended freely in the gelatine a magnetic needle. These are covered with brass cases and let down in the bore to a fixed depth. They remain there undisturbed several hours till the gelatine has set, and meanwhile the needle fixes itself in the meridian. On withdrawal the phials can be replaced at the same angle they had in the bore by bringing the surface of the gelatine to the horizontal, and the bearing of the bore can be taken by putting the needle in the meridian. From several such operations at a sufficient number of points the course of the bore hole can be platted.

Elements in the Design of Roll Crushing Plants.

Written for the MINING AND SCIENTIFIC PRESS by JESSE SCOBEY, Denver, Colo.

While the use of rolls for coarse crushing has always been considered good practice, it is only in the last few years that their use in fine crushing has been acknowledged feasible, and their work a success. This is mainly due to the fact that in coarse work the range of adjustment below the point necessary to crush to the desired size is large, while in fine work it is small, consequently the limit of the work that the roll will do is more pronounced, and disappointments were more frequent from the great expectations sown by some makers in the recommendation that the capacity of the rolls is practically unlimited. The fallacy of this assertion yields to easy solution, both on paper and in practice. According as the limit of the capacity is approached more care must be taken in the details of installation and operation. The simple computations to be made in the design for the crushing department of an ore-dressing plant are frequently overlooked. You are led to believe from the discussions heard in most milling circles, that the poor work of a machine at a certain mill is due to a defect inherent in the machine and not in its installation. Of course this idea is abetted by the local man who put the machine in place. This conclusion is frequently deserved, as too often the mill man is forced to use an article as supplied from some machine house, because the representative is a good fellow, and "a good turn is due him," or, maybe a heavy stockholder is connected with that house, however, there are places for all machines. All machines are not good in one place, nor is one machine good in all places. Where other plants are profitably working in the same district, it is wise for a new mill to keep on similar lines. Undoubtedly the subsequent treatment must largely decide the class of machine for the final comminution of the ore, and for the same treatment a hard or soft ore may employ widely different principles in their economic breaking, but when this question is decided for you, or forced on you, the success or failure of the machine installed may be foretold by the size chosen, the speed to be given it, the design of its accessories and the care with which it is put in place and operated. The extremes in this case are found in rolls, and their error more apparent. The rule of thumb and the catalogue man are especially prominent in installations of this kind. In coarse work they must try hard to fail. Fine crushing with rolls, however, is a modern accomplishment and the work of the roll is often depreciated as the result of the unbalanced parts of elevator and screens, size and feed, or in the careless adjustment of speed. It is only of recent years that fine crushing has been studied, and in some regions it is even yet little understood. The larger machine houses have brought out important improvements and refinements in their rolls to meet the growing tendency to use them in fine work; a radical step is to omit springs altogether, to give a positive force to the blow, as it is to be supposed that all metal has been previously screened from the pulp.

The diameter to be chosen is commercially limited among the wide-faced rolls by those carried in stock at mining centers; the larger diameters to be used on coarser work on account of their greater nip, the smaller on fine for lessened expense of installation and repairs, though run at greater speed to get the same or higher peripheral speed.

To avoid crowding or choking the peripheral speed must be greater than the velocity of the falling stream of ore. This may be determined by applying the law of falling bodies—

$V = \sqrt{2gh}$, where

V = the velocity of the body.
h = the height or distance the ore falls.
g = the force of gravity.

To find h, measure the vertical distance from the center of the rolls to point on feeder or launder from which the ore has an uninterrupted fall into the roll; for a 27″ roll this may be in many cases about 3 feet, therefore, v = 64.4 × 3 = approximately 14′ per second, or × 60, 840′ per minute.

The circumfrence of the roll shell is $2\pi r$; for a 27″ roll the circumfrence is 3.1416 × 27″ = 7′. The revolutions per minute of the roll would then be at least 840 ÷ 7 = 120.

It is economical to keep h, the height, as low as possible, and where size or conditions of heating in bearings make a lower speed essential the problem should be reversed, and, with a known speed the height of fall should be determined. This simple calculation may be easily applied and may explain a tendency to choke or an excessive cheek-plate wear.

The actual speed of the roll should of course, in the above case, be slightly greater than 120 revolutions, probably 125, as it is important to remember, especially in wet crushing, that there is a velocity of approach, and it must be taken into account, otherwise there will be a wash around the sides.

The capacity of rolls at different speeds for different meshes is a matter of computation, the results from which may be plotted to very handy curves; the important feature, however, is not to overlook the returns, which are variable with different ores. Consider the case of grinding to 30 mesh, on a hard ore; it is impracticable to space the rolls to a certain mesh; the best that can be done is to set the rolls to touch evenly across the face, to lock them in this position, and then put the required tension on the springs. In any case the tension must be held static in the tension rod and must not be conveyed to the roll bearings by having an initial pressure between the shell faces. The pressure on the bearings must only come into play when calling out the reserve energy of the springs, or must only just equal the pressure required to crush the rock, but taken theoretically, for the case of 30 mesh, the shells should be about $\frac{1}{72}$ of an inch apart, as the mesh opening of 30 mesh is $\frac{1}{60}$ of an inch, to which 5% should be added, or more properly deducted, in order to allow for the probable easement of the springs when working at a full load. Using the average standard size of the machine house, a 14″ x 27″, the 14″ shell will have about 12″ effective line of contact; the area at the line of least section would be 12″×$\frac{1}{72}$″ or $\frac{1}{6}$ square inch; at 125 revolutions previously developed, the peripheral speed will be 125 × 7 = 875′ per minute and 875′ × 12″ × $\frac{1}{6}$″ = 1750 cubic inches per minute, or 105,000 cubic inches per hour, or approximately, 61 cubic feet per hour, as the total maximum cubic contents that can possibly be crushed and passed between the shells. Allowing 20 cubic feet of ore to the ton as an average, we may deduce that practically only three tons per hour, or seventy-two tons per twenty-four hours, may actually pass through the roll. This, however, is not the capacity, as the returns must be considered.

From daily tests, covering one months' continuous work at the Avino mill, I found the average results from two rolls working side by side on divided streams of the same ore, both grinding to 30 mesh, for thirty days, to be:

Of the pulp that had been previously screened and treated and relieved of the 30-mesh undersize, and going to the rolls, 88% was over 30 mesh, or 12% was already under 30 mesh.

Of the pulp discharged from the rolls, including the reground returns, before going to the screen, 50.1% was now over 30 mesh, or practically 50% of the pulp was capable of passing a 30-mesh screen, but of this same pulp, after screening on a 36″ x 60″ trommel running twenty-two revolutions per minute, the oversize returning to the rolls contained an average of 73% over 30 mesh, or 17% that passed the 30-mesh hand test screen, that did not pass the 30-mesh trommel.

The first figure is only interesting, but the last two useful in the present. Applying this experience to the above problem, there is 17% of the original 49.9% undersize that is returned, or 8.5%, this, plus the 50.1% gives 58.6% of the pulp that has passed the roll as returning as oversize, so only 41.4% of the total 72 tons that may pass the roll is available as new feed, or actual capacity of the rolls, or 29.8 tons per 24-hour day. In other words a feed of 29.8 tons, together with the returns from this feed, make a total tonnage of 72 tons actually passing the roll.

This theoretical deduction I have found to very closely check the capacity of rolls for fine hard work, when all the shells are in perfect condition and all parts are running smoothly, and having careful attention. However, as before mentioned, it is impracticable to set a roll to $\frac{1}{72}$ of an inch; in mill practice they are commonly set to a point of contact of the high points of the shell, and the average opening, when running full capacity may be taken at about $\frac{1}{32}$ of an inch; at least this opening should be allowed in designing the elevator and screening surface. Under this condition there are proportionally more returns, and more ore is permitted to pass the rolls, although there is an increased crushing action of the particles among themselves.

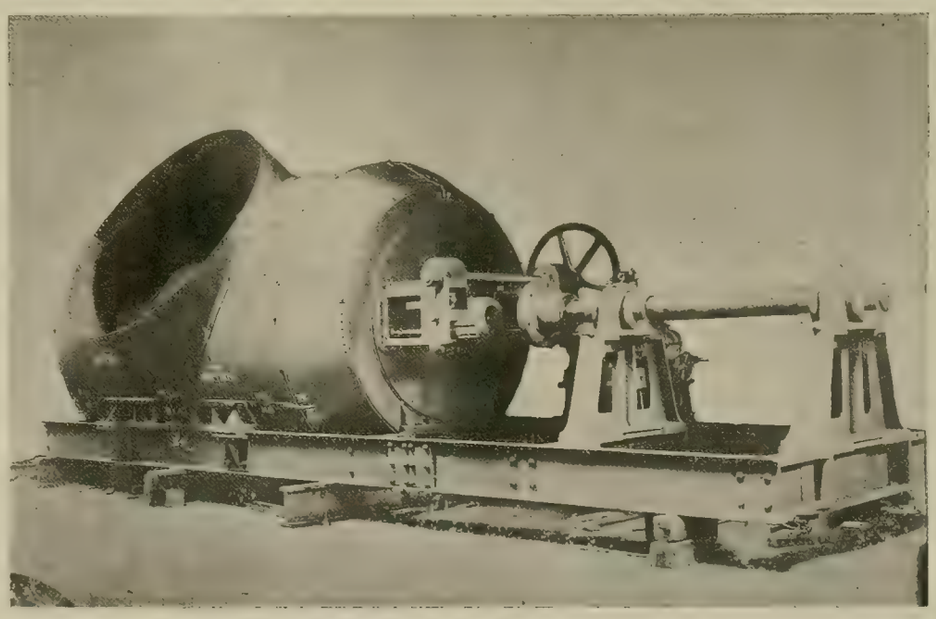
At an $\frac{1}{32}$-inch opening the area of contact is 12″ × $\frac{1}{32}$″ = $\frac{3}{8}$ square inch, and 875 × 12″ = 3937 cubic inches per minute or 236,250 cubic inches per hour, or 136 cubic feet per hour; this at 20 cubic feet of ore per ton = 6.8 tons per hour approximately, or 163 tons per 24 hours that may pass through the rolls. As we are trying to make this calculation approach the practical in order to compute the elevator, let us assume that we wish to crush 30 tons of crude stock in 24 hours under the above conditions, by allowing heavy returns—we have 163 tons that may pass the roll, this, minus 30 tons as feed, gives 133 tons that may be returned, or 82%. Accordingly, of the pulp passing the rolls, 58% may be considered as the minimum and 82% as the maximum returns to the roll. Should it be convenient to have the returns in percentage of the actual capacity, the above figures give 138% as minimum and 445% as the maximum returns that must be handled. These two above limits have been found to very closely check the practice of rolling, notwithstanding the claims of catalogues or makers. When the shells are new and true the first condition, with only small returns, is attained, but perpetual vigilance is not the attribute of the every-day mill man, and with a hard ore or pitting shell the latter condition soon prevails, and this condition should always govern the size of the elevator to accompany the rolls; it must be of capacity to meet the greatest load that may pass the rolls.

In operation daily tests are taken to see that the rolls are kept set between these limits. A saving of a single choke-down will easily pay for several months' expense of such a record. With this allowance a roll of 30 tons capacity must have elevator capacity for 163 tons; this is oftentimes the secret of roll work.

The ore in wet crushing represents about one-tenth of the pulp, or about nine parts of water must be added to serve as a carrier for the ore in elevators and launders, so that the total water and ore elevated per 24 hours, for a 30-ton roll, carrying 163 tons, would be 1630 tons:

163 tons ore at 20 cubic feet = ... 2,260 cubic feet.
1,467 tons of water at 32 cubic feet = ...46,944 cubic feet.

This total elevator capacity may be called 50,000 cubic feet per 24 hours, or about 35 cubic feet per minute. Taking the average elevator belt speed of 300 feet per minute, and for heavy belt a space of 18 inches between buckets, 200 buckets will rise per minute, and must carry 35 cubic feet, or one bucket must carry .175 cubic feet, or 302 cubic inches; referring to the rated capacity of the elevator buckets of standard make it is found that a 12″ x 7″ x 6″ has 300 cubic inches capacity, and is accordingly the least that can be safely used for the full capacity of the roll. The above figures are simple and cannot be refuted; their application may explain several failures. The use of a bucket smaller than 12 inches is a mistake I have made, and I one believe that is still quite common. Even with this size it is seen there is nothing to spare, though of course the re-



50 H. P. Turbine for McCloud River Electrical Co. of San Francisco, Cal.

(See front page.)

turns should always be kept below 82%. It is important to have the elevator set at an angle from the vertical, generally about 20°, and it will be noticed that most standard cups are constructed to have their full capacity at this angle. The capacity of the elevator is greatly aided by an idler supporting the loaded belt at about half of its lift; it prevents swaying and consequent splashing over of the buckets. Of course this makes heavy construction, but as a unit it is mainly desirable from the fact that the system takes less lost time in repairs and shutdowns, and as a whole little attention other than renewals, and these only when the parts are worn out in duty.

Notes on Cyaniding in the Black Hills.

Written for the MINING AND SCIENTIFIC PRESS.

Less than two years ago cyaniding was of very little importance in the Black Hills. At the present time it is proving to be the salvation of many mining companies. About 75% of the ore in the Black Hills is adapted to cyaniding either direct or after amalgamation. These ores amenable to cyanide are of different characters, and among them are some of the best kinds of cyaniding propositions.

In the latter class the Ragged Top ores, opened up in the last few years, take the lead. In that district are immense ore bodies of a porous limestone formation, somewhat similar in character to the Mercur ores and carrying on the average $6, $8 and $10 gold to the ton, which gives up readily to cyanide by coarse crushing.

The Spearfish M. Co. are operating a 200-ton mill, the largest in the Hills. They use Gates crushers, then rolls, so the ore passes a ½-inch screen, and, leaching at that mesh, they get from 80% to 85% extraction.

The ores of the Yellow Creek district are also well adapted to cyaniding after coarse crushing. The ore is quartzite, but the values are nearly all on the cleavage planes, so that crushing to a ¼-inch mesh gives nearly as good an extraction as with the Ragged Top limy ores. The Wasp M. Co. have a very complete 50-ton mill, which has been running very successfully on the Yellow Creek ores since last fall. This ore carries so much silver that the bullion is over half silver. A new wet-crushing mill is contemplated on the adjoining property.

Then, in the Bald Mountain district, around Portland, is an entirely different class of ores, it being a very hard, close-grained, siliceous ore, classed as brown oxidized and blue unoxidized, the former being amenable to cyanide, while the latter carries better values and is smelted. This oxidized ore is of a different character than any of the others referred to, as it requires fine crushing for a good extraction. The old Deadwood cyanide plant, the first one in the Hills, operated several years on ore of a somewhat similar character. They crushed dry to 30 mesh, but recently closed down. Fine crushing on a hard ore with rolls is expensive, and on many ores is not as satisfactory or economical as wet crushing with stamps, using a weak cyanide solution instead of water. Bald Mountain ores are so hard and close-grained that fine crushing is necessary. The wet-crushing cyanide mill has been found most successful for these oxidized ores. With this method the ore is crushed with the weak cyanide solution right in the mortars. The sands and slimes are separated and the latter given a special treatment at little or no increased expense, and the total cost and time is less than for the dry-crushing mill, and gives as good or better extraction. The Portland M. Co. are operating such a wet-crushing cyanide plant on Bald Mountain ores near Deadwood. The Dakota M. Co. are also building a wet-crushing plant for a similar ore.

The Imperial M. Co. are planning to build a dry-crushing mill with rolls and a roasting plant so as to handle some of the unoxidized ores.

Besides the above different types of plants, there are several tailings plants. In this class is the immense plant for the Homestake mills. There the tailings from the plates run to jigs, which take out the heavy concentrates, while the tailings that pass from these jigs go through other large jigs, which take out most of the slime, and then the remaining sands are carried to the cyanide mill in a large iron pipe, where they are automatically distributed into the leaching tanks, the rest of the slimes overflowing to waste.

So, nearly all the different types of cyanide plants are represented here in the Hills. Most of the mills have little refineries for acid or roasting cleanup methods and turn out good bullion. Zinc shavings is the common precipitant, but the Homestake uses zinc, and charcoal is being given a trial for the weak solutions from the slimes treatment. While cyaniding was comparatively a new adventure for some of the mining men, and experience had to settle the best method in each mill, a good many original applications of old ideas have been brought out, and in a year or two more the Black Hills will be the greatest cyanide district known, embracing plants of every description. S. A. E.

Differences of Depth in the Original Positions of Epigenetic Deposits.*

By Prof. J. H. L. VOGT, University of Kristiania, Norway.

The attention of both miners and geologists was long ago drawn to these theoretically interesting and economically important problems; yet only in recent years have they received thorough and comprehensive treatment.

These two phenomena—namely, the original differences of depth connected with the formation of ore deposits, and the secondary alterations of such deposits, occurring often, perhaps even millions of years later—are in many cases, as genetic factors, very widely separated; yet it may often be difficult to decide what is to be referred to the primary and what to the secondary process.

ORIGINAL DIFFERENCES OF DEPTH.—In considering the original differences of depth, it must be kept in mind that the present surface is, in general, very far below the surface existing at the time of the ore formation. The geological investigations of recent decades have shown that the work of denudation (or abrasion or erosion) must be measured on a larger scale than was formerly suspected. In the Archæan and Algonkian mountain chains (now often removed by this agency down to their base level), and also in the Paleozoic ranges (showing, as a rule, the effects of extremely energetic denudation, as, for example, the Ural and the Norwegian mountains), the difference between original and present levels is to be generally reckoned, not in such units as 0.1, 0.25, 0.33 or 0.5 kilom. [300 feet to 1650 feet], but rather on the scale of 2, 3, 4 or 5 kilom. [1 mile to 3 miles], or even more. Even in the Mesozoic and Tertiary, many denudations of astounding depth have been recognized.

As instances of great denudation the following may be named:

On the E. side of the Kristiania fiord, in Norway, this process has removed, (1) a series of Devonian conglomerates and porphyry overflows, with Silurian and Cambrian rocks, of an aggregate thickness of 2500 meters [8200 feet]; (2) also a large part of the Archæan surface—first, during the long period preceding the Cambrian, and again after the removal of the Cambrian, Silurian and Devonian strata. This thickness must also be measured in thousands of meters; so that we have here at least 4000, perhaps 5000, 6000 or even more meters of thickness removed.

In the Aspen silver district, Colo., 5 kilom [16,400 feet] of strata have been removed by erosion from a range of Tertiary origin.

In many epigenetic ore deposits of Archæan-Algonkian or Paleozoic origin (e. g., Kongsberg, Cornwall, Przibram, the Keweenaw peninsula at Lake Superior) mining has been carried to depths of 2500, 3300 to 4100, and 4100 to 5000 feet. Taking the depth roughly as 3300 feet, and assuming that in some districts the present surface has been denuded 10,000, and in others 13,000 feet below the surface at the time of the ore formation, we may say that mining has reached a depth of 10,000 to 13,000 or 13,000 to 16,000 feet below the original surface.

These figures are, of course, somewhat arbitrary; but modern investigations of the extent of denudation justify us in saying that they are not too high for some districts belonging to the ancient geological periods above named.

It may be observed, also, that in many deposits of deep and geologically old origin, the deepest portions of the mines have shown no change in the nature of the fissure formation. Occasionally, as at Przibram, Bohemia, and Dolcoath, Cornwall, the richest ore bodies have been encountered in the deepest mine workings.

We conclude, then, that, under favorable circumstances, the ore veins may continue at least to a depth, below the original surface, of 10,000, 13,000, 16,000 or more feet.

It may also be remarked, in passing, that mineral deposits may be made from solutions at above the critical temperature (364° C.) of water—for instance, the deposits of cassiterite, wolframite, apatite, topaz, tourmaline, and even pyrites, in many granite-pegmatite veins.

In his latest treatise, which is rich in new conceptions, De Launay compares ore deposits occurring relatively near the surface, in less denuded regions, with those deep below the surface in strongly denuded regions. As instances of the former, he takes the quicksilver deposits, which occur chiefly in recent rocks, near volcanic eruptives, while from older ranges, partly destroyed by erosion, they have disappeared, with other debris. As instances of the latter class, he takes the pyritic deposits (Roros, Huelva, Schmollnitz, etc.), which have been found in old mountain chains or in districts of regional metamorphism, and are to be explained as of deep-seated origin. He also mentions very briefly the lead-silver veins.

Induced by this description I have suggested the hypothesis that the differences between the later gold-silver-lead veins (Nagyag, Comstock, Potosi, etc.) and the old gold and silver-lead veins (Kongsberg, Erzgebirge, Harz, Przibram, etc.) may be explained by their formation at different depths. The relative or total absence from the older veins of the propylitization which is so characteristic of the later ones may, perhaps, be due to the fact that hydrogen sulphide (or sodium sulphide), which was a very important factor in this process, could not, under the great pressure due to great depth, make its way from the solutions in the fissures into the country rock.

The later silver-lead veins are, on the whole, richer in silver than the older ones. This may be connected with the fact, inferred on physico-chemical grounds by Van Hise, that at a great depth lead sulphide separates in larger proportion than silver-sulphide or sulpho-salts. According to this view, the precious silver veins (carrying relatively little galena and zinc blende) of recent eruptive ranges become, at a very great depth, richer in galena and zincblende. This seems to be sometimes the case. (Instances are given further on.)

This hypothetical view is not contradicted by the fact that many of the older silver-lead veins, as at Andreasberg and Kongsberg, are highly "precious"—i. e., relatively poor in galena and zincblende; for this character may be due to the small proportion of lead and zinc in the original vein solutions.

In view of the range below the original surface through which mining is carried on, beginning, not at that surface, but already thousands of metres below it, we may easily see that, in many districts, the directly observable differences in original depth have little significance. For instance, at Kongsberg there is no difference in the character of the veins from the present surface to 0.5—0.75 kilom. below it.

In other districts, however, very important differences of original depth have been established. For instance, these differences were very distinct in many Cornish mines, where the veins carried: (1) at the uppermost level (in the tin-bearing gossan) tin stone and a little copper ore (the latter as the result of a secondary process, the original sulphides having been mostly leached out of the gossan); (2) their copper ore, with some tin stone (in the Dolcoath mine, to the depth of 0.3 to 0.33 kilom. below the present surface); (3) still deeper, first, a zone of mixed tin stone and copper ore, and under that almost exclusively tin stone. The veins traverse, in depth, chiefly granite; at higher levels, slates. But zones 2 and 3 are not confined to either rock. In this case, then, the tin stone was originally deposited at a greater depth than the copper ore.

In many silver-lead-zinc veins there is an increase in the proportion of zinc-blende with depth. The Clausthal veins, and many in Mexico (Pachuca, Zacatecas, etc.) are instances. In the latter, very important differences in the depths of original deposition are often observed. (1) Near the surface are very rich silver ores (the so-called colorados, containing cerussite with chloride, bromide and iodide of silver, and native silver), the richness of which is the result of secondary processes. (2) Below these, after an intermediate zone of transition, appear for the first time the so-called negros ores—galena, silver-glance, silver sulpho-salts, etc.; and (3) in the deep workings, say 0.5 kilom. below the present surface, the so-called fuego ores, carrying much zinc-blende and galena, with a scanty admixture of true silver ores. It is possible that the Tertiary Mexican veins have in depth a character resembling that of the older rather than that of the younger group described in a previous part of this paper.

With regard to the increase of zincblende in depth, which has been observed in many places, I have already observed that Van Hise, in his last paper, concludes upon theoretical grounds that from an ascending solution containing zinc and lead, the zinc sulphide would be deposited lower down than the lead sulphide. In many veins carrying copper and iron sulphides, the richest copper ores are found at the higher levels. As Emmons and Weed have shown for the Butte district, this is in numerous cases the result of a secondary process. In sundry localities, however, the influence of original differences of depth may be recognized. This is the case, for instance, at Vigsnas in Norway, where the ore, a fine-grained mixture of chalcopyrite with pyrite, occurs in several (about seven) nearly vertical "stocks." In the upper levels the pyritic mixture carried easily 3% to 4% of copper; at the depth of 735 meters the thickness of the mass was, on the whole, tolerably well maintained; but the copper content had sunk to about 1%, or a trifle more.

A corresponding phenomenon is not presented, however, by the flat-lying pyritic masses or "lineals" at Roros, which dip respectively 9°, 9° and 15°, and have been worked in these dips to distances of 1080, 1350 and about 2000 meters.

In the pyritic deposit at Huelva (at Rio Tinto, Tharsis, etc.) the secondary concentration in the "zone of enrichment," immediately below the "iron hat," plays a very important part; but there appears to be, besides, a primary distribution according to which the copper diminishes as depth increases.

According to many American reports, there are also in the United States and Chile many known instances of the deposition, from an ascending ore solution of pyrite and chalcopyrite, in which the former was, to a considerable extent, deposited deeper than the latter.

*Trans. Am. Ins. Mining Engineers, Feb., 1901.

Rare Minerals in Gold-Quartz Veins of Eastern Oregon.

Written for the MINING AND SCIENTIFIC PRESS by WALDEMAR LINDGREN.

ROSCOELITE.—This rare mineral is of considerable interest, as it generally has been found closely associated with native gold in gold quartz veins. First discovered in several small quartz veins near Coloma, El Dorado county, Cal., it has again been found in Boulder district, Colo., and lately, also, in Kalgoorlie, Western Australia.* The mineral belongs to the group of the potassium-mica, in which the aluminum is partly replaced by vanadium. The analyses disagree somewhat, and a definite formula is not, as yet, established. The original analysis by Genth gave:

SiO_2	47.69
V_2O_3	20.56
Al_2O_3	14.10
FeO	1.67
NgO	2.00
K_2O	7.59
Na_2O	.19
H_2O	4.96
Total	98.76

During a recent examination of eastern Oregon, I found this interesting mineral at several mines, always associated with rich ore and ordinarily much free gold. It occurs abundantly in the reeently discovered rich shoot of the Belle of Baker; in the rich shipping ore found some time ago in the Golconda mine, and, finally, in a similar rich shipping ore lately discovered in the Columbia mine. The mineral, which is very conspicuous and looks much like finely divided chlorite, has a dull greenish color with a slight tinge of yellow. It occurs intimately intergrown with quartz in micro-crystalline aggregates of tufted fibers, generally so fine that its separation from the quartz is almost impossible. The mineral has high double refraction, but the fibers do not seem to be strongly pleochroic. The gold is frequently intergrown with it or surrounded by it.

CHROMIUM-MICA.—The argillites and quartz in many of the mines of the Greenhorn mountains contain greenish spots, which have often been mistaken for copper, but which in reality consist of finely divided chromium-mica (fuchsite or mariposite). The same mineral also occurs at the Golconda mine, and the stain is somewhat similar to that of roscoelite, but of a slightly more bluish tinge.

CALCIOVOLBORTHITE.—A mineral allied to this species was found in the Little Baby copper prospect, near Gilkeson's ranch, about 25 miles northeast of Baker City. It occurs as bright citron yellow scales and aggregates with pearly luster on the black, soft argillite in which the copper prospect occurs. Only a small quantity could be obtained for examination. It is essentially, according to Dr. W. F. Hillebrand, a vanadate of copper, but contains, besides, some sodium, and while corresponding approximately as to its percentage of copper and vanadium with the mineral mentioned, it is probably, in fact, a new species.

SHEELITE.—This tungstate of lime occurs at the Flagstaff and Cliff mines near Baker City, as first shown by Mr. C. King of that place. The mineral forms white masses, intergrown with quartz, and is not crystallized. Scheelite is not uncommonly found in gold quartz veins. It has been noted in such veins at Grass Valley, Cal., Warren, Idaho, and also in New Zealand.

CINNABAR.—In the Columbia, the Ibex and other gold-quartz veins near Sumpter, small quantities of cinnabar have been found. The placer mines of Susanville also contain cinnabar in pebbles intergrown with quartz.

MERCURIAL TETRAHEDRITE.—A tetrahedrite, containing mercury, was identified by Dr. Hillebrand in specimens of rich ore from the Columbia mine at Sumpter. The ore contained, besides, roscoelite and native gold.

*T. A. Rickard, Eng. and Min. Journal, Nov. 17, 1900.

AN official statement received at Dawson from Ottawa shows that up to the first of this year the total royalty collected from the Klondide mines by the Canadian Government amounts to $2,040,192.61. The statement also contains the information that the total revenues received by the Canadian Government from Yukon Territory since 1896 amounts to $4,376,-673.17. This includes receipts from royalties, customs, public works, fisheries, fees in various departments, land sales, rentals, timber dues, placer grants, sales of miners' certificates and the like. The excess of receipts over expenditures of construction in the fund for the entire period since 1896 until the first of this year is $693,820.

A new artificial stone is made by heating seven parts of sand with one part of Portland cement. The dry mixture is run into steel molds. The latter are then run into a boiler and boiling water turned in under pressure sufficient to force it through the sand in the molds. The cement slacks, but is not allowed to expand, the setting and drying taking place under the resulting enormous pressure. The finished structure is a very hard stone, costing in desired shapes less than natural stone.

Salt Lake County, Utah.

[STAFF CORRESPONDENCE.]

The Columbia group has been working of late by leasers, who mill their product at the Rogers mill. Most of the ore averages about 5½% copper. A recent 200-ton lot ran 6½% copper, with small values in gold. The question of erecting a mill for the Columbia is being considered.

The Shawmutt, in charge of R. G. Legg, has completed a mill which may start up soon. The mine is opened through a 200-foot incline, with drifts therefrom at the 100 and 200 stations. The U. & I. vein, which belongs to the Shawmutt, has been opened through a shaft and tunnel.

The Last Chance, located at the head of one branch of Carr fork, belongs to C. J. Hodge and associates. It has an old concentrating mill which is being repaired and put in condition to operate on silver-lead-iron ores from the upper workings. The lower tunnel goes in 3000 feet and is being pushed on through the lime foot wall, through the fissure to the quartzite hanging wall. A shaft from the surface connects with this tunnel; the latter gives 1500 feet of stoping ground above it. The surface holdings here are extensive. The deeper workings are expected to get into the copper belt, similar to the one in which the Highland Boy is mining.

The Highland Boy is operating a new Rand compressor, which is a cross-compound with intercooler between the high and low pressure cylinders. The low pressure air cylinders are 18x36, the high pressure being 10½x36, the low pressure steam cylinder being 22x36 and the high pressure 12x36.

The Yampa mine, situated east of the Highland Boy, belongs to the Tintic M. & D. Co., whose development is in charge of W. J. Craig. Their holdings cover about 3000 feet along the apex of the vein. The ores comprise an iron and copper sulphide, with values in copper and gold. The plan is to drive 3000 feet along the strike of the vein, to connect with a 1600-foot shaft from the surface at a higher point The tunnel is now in 200 feet and the contemplated deep shaft has been commenced.

The Ben Butler is west of the Red Wing. It is being opened through a tunnel that enters at the bottom of the gulch, going in most of the way on the vein. From a station near the breast of the tunnel a stope 70 feet high has been carried for some distance. At another point a raise has been made on a shoot of ore and stoping is being done on both sides of the raise. Work has commenced to connect with the old workings farther east and above. It is claimed the ore here runs as high as 25% copper, 36 ozs. silver, 12% to 15% iron, 5% lead and $5 gold. A recent 75-ton shipment to the smelter was made. They have a considerable amount of mill ore. In the older workings above the ores were considerably oxidized. A. L. Jacobs is manager and J. E. Tadlock superintendent.

The leases on the Red Wing are all expiring and it is likely the company will operate its own mine from now on. Four cars of ore were recently shipped to the smelter from this property.

The Winnamuck mine and mill are under bond and lease to the Tiewaukee M. Co., the latter owning grounds above and adjoining the former. The old Winnamuck mill has been equipped with new concentrating machinery and will soon be operating on material from the old Tiewaukee dump, a horse tramline having been built to connect the two.

Bingham Canyon, May 18, 1901. WASCOTT.

Patent Office Exhibit at Buffalo.

The Patent Office exhibit in the Government building of the Pan-American Exposition presents some of the newest models of inventions in lines of economic development. It aims to show the influence of the patent system in our civilization, and to give some indication of the probable increase in comforts and luxuries that will be accessible to the masses of people in the next quarter of a century.

It shows how the progress in invention in one age makes it possible for the poorer classes to enjoy in a later age what was not even accessible to the rich a score of years before. Twenty-five or thirty striking inventions of domestic utility or economic significance graphically illustrate the possibilities in this respect.

A number of specimens of cotton are shown which by a chemical process are so treated as to render them indistinguishable from silk. A large number of models in a great glass case illustrate the development of the harvesting machine. The Ives Kromskopi, an instrument that makes it possible to view a photograph in colors, is an interesting exhibit. A model that is of no practical importance, but of considerable popular interest, is one made by Abraham Lincoln.

ON the islands of southeastern Alaska they have a type of prospectors known locally as "beach combers." There are no roads and very few trails in the country, and boats are an indispensable portion of a prospector's outfit. When the first rush swarmed past these islands to the Klondike the scattered white population of the islands, salmon and halibut fishers for a few months each year, turned to prospecting between seasons. Ore vein exposures of gold and copper are numerous on the rocky beaches and the early prospectors located these beach exposures, claiming everything that showed even pyrite. They never explored or located claims away from the beaches, hence the name.

Cost of Diamond Drilling.*

By J. J. JORDAN, M. I. M. M.

The subjoined figures refer to a series of six 1¾-inch prospecting bore holes sunk in the Sombrerete Co.'s San Pedro mine, Fresnillo, Zacatecas, Mexico, in 1898. The motive power was compressed air, and the water needed for washing out the hole and cooling the carbons was pumped from an adjacent mine drain. The bores were made from the 827-foot level, and involved cutting two rises of 30 feet clear to accommodate rods when lifted. The rock was hard grayish-blue slate, with seams of quartz and heavy spar carrying some argentiferous pyrites. At each set-up of the drill three holes were bored.

DETAILS OF HOLES.

	A.	B.	C.	D.	E.	F.
Angle of inclination	36°	48°	56°	63°	64°	80°
	Ft.	Ft.	Ft.	Ft.	Ft.	Ft.
Depth of hole	233	263	290	263	362	441
Length of core obtained	140	185	215	183	267	355
Aggregate depth of holes bored						1852 feet
Average percentage of core lost						27.4
Total time occupied, including all stoppages						3360 hrs.
Actual time drill was working						2480 "
Time lost by stoppage of drill						320 "
Time lost between shifts, in changing						560 "
Percentage of time drill actually worked						73.8
Percentage of time lost						26.2

DETAILS OF COST.

	Total cost.	Cost per foot.
Labor—two drill runners	$ 475 00	$ .256
Labor—one carbon settler	775 00	.512
Labor—two helpers	168 00	.090
Carbons, 21 carats at $40	840 00	.452
Coal, 25 tons at $11	275 00	.148
Core boxes, 30 at 50c	15 00	.008
Bits, 26 at $15 per dozen	32 50	.018
Core shells, 5 at $3.15	15 75	.008
Core springs, 12 at $3.15	37 80	.020
Candles, 320 pounds at 12½c	40 00	.022
Coal oil, 80 gallons at 50c	40 00	.022
Lubricating oil, 10 gals. at 50c	5 00	.002
Carpenters' and smiths' work, repairs, etc	12 50	.006
Sundry extra labor	4 00	.002
Labor, cutting rises	200 00	.110
Totals	$2,935 55	$1 676

*Trans. London Inst. Min. & Met.

The Training of Workmen.

Nearly all trades and handicrafts have been invaded by machinery, some in a vastly greater degree than others. Work which was deemed beyond the capacity of machines but a few years since is now regularly done by them, and the best craftsmen to-day in many industries are those who execute repairs. These facts are enough to discount the value of a long apprenticeship now. But more remains to be said.

Apprenticeship under the old guilds was an intensely personal relation. But the relations between employers and factory hands to-day are impersonal. An apprentice now is only so in name, a numbered unit who puts in his cheque with other numbers. He is not taught a trade. He must pick it up for himself. It is nobody's business to instruct him, neither his master's, nor his foreman's, nor the workmen's. In some of the smaller shops in country towns traces of the old relations still remain, but they are becoming more and more exceptional.

It is generally to the interest of an employer that an apprentice should not learn his trade as a whole, but only a little section of it. It pays better to keep a lad repeating the performance of one section of his craft than to teach him all. More money is made. But the apprentice becomes a young specialist over some little piece of handicraft, at which he may earn something over his normal wages. And many a lad does not become disillusioned until he has to face the world and try his luck in other shops. And, therefore, the best shops in which to place a lad are not the big establishments, but the small ones, where every class of work is done, and the tools and appliances are often scant. A lad will learn more in these than in those replete with every appliance, and minutely subdivided into sections and groups.

The best training for a lad to-day is that which he can evolve for himself. The greatest evil that can befall him is to become a specialist, and nothing more, while in his teens. Yet that is what must happen if he spends several years tending machines, or doing repetitive, unvarying tasks in one big establishment.

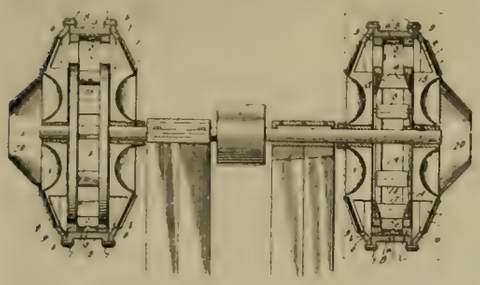
The best training, therefore, to-day is that gathered by the peripatetic youth. If a lad cannot gain experience in one place he should move about, gathering as much as he can accumulate with one firm, then on to another, and attending training schools as opportunity offers. His views become broadened, he becomes self-reliant, and, in time, having found his true work, he may settle down as a specialist.—Joseph Horner, in Cassier's Magazine for June.

Mining and Metallurgical Patents.

Patents Issued May 21, 1901.

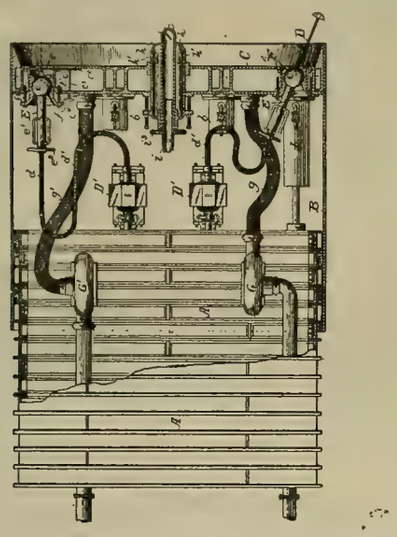
Specially Prepared for the MINING AND SCIENTIFIC PRESS.

AMALGAMATOR.—No. 674,624; J. Y. Byers, Descanso, Cal.



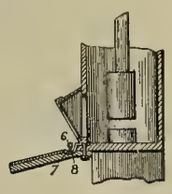
The muller comprising a pair of annular plates having inner sides beveled and converging outwardly, shoe rings having circular rabbets on inner sides, in which rabbets annular plates are disposed and cross-blocks disposed between annular plates and spacing them apart, cross-blocks, annular plates and shoe rings being secured together, in combination with a revoluble cylinder having annular dies on which shoe-rings operate, a runaway being formed between annular dies.

TUNNELING APPARATUS.—No. 674,415: D. L. Hough, New York, N. Y.



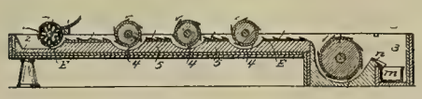
A hood or shield, a bulkhead in hood or shield comprising an outer rotatable part or tool carrier and an inner stationary part, means to rotate outer part and means to supply water under pressure to space between outer and inner parts.

METHOD OF TREATING ORES.—No. 674,639; M. Seligsohn, Denver, Colo.



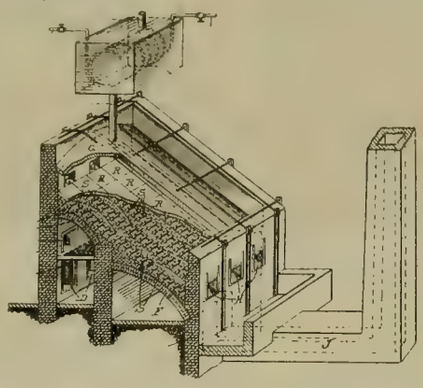
Process of treating ores which consist in discharge into wet pulp, of air charged or impregnated with ammoniated air and bromine gas which will not only alter physical condition of particles being treated, but also is efficacious in saponifying any grease or oil that may be present in pulp, clarifying and making pulp more amenable to amalgamation by its action upon clay and matter in suspension and keeping amalgam upon plate clean and of proper consistency to accomplish its functions, and passing so-charged pulp over an amalgamating plate.

GOLD SEPARATING MACHINE. — No. 674,533; J. Broyles, New Whatcom, Wash.



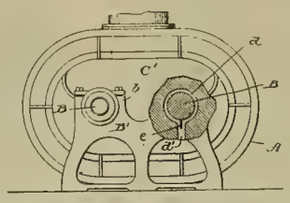
A frame having an elongated reservoir at one end, a second reservoir at opposite end, and a series of reservoirs approximately midway of its length, double plate secured to frame between reservoirs, a hollow metal cylinder over elongated reservoir, a concaved scraper secured to sides of frame and having one edge bearing against cylinder, means for magnetizing surface of cylinder, cylinders having perforated plate on surfaces over series of reservoirs, a larger cylinder having a perforated plate on its surface in the remaining reservoir below plane of other cylinders, a shaker box in reservoir, a plate secured at one end of frame passing under cylinder and having a flared end entering shaker box, a trip wheel on the spindle of large cylinder, a lever pivoted to side of frame and having its free end engaging trip wheel, a second lever fulcrumed at one end to first-named lever and secured at other end pivotally to shaker box, means for adjusting cylinders and means for operating cylinders simultaneously.

PROCESS OF TREATING ORE.—No. 674,594; C. J. Best, Denver, Colo.



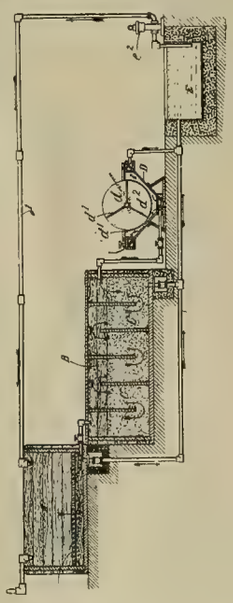
The process of treating ores, which consists in preparing a compound, consisting of one part of common salt, one-sixteenth part of permanganate of potassium, six parts common niter and from ninety-two to ninety-six parts water, all dissolved, then crushing ore to a fineness of preferably twenty mesh, then sprinkling ore with compound and letting it lie for approximately twelve hours, then roasting same in a muffle furnace, with 1200° to 1500° of heat.

ROTARY BLOWER.—No. 674,536; T. W. Green, Philadelphia, Pa.



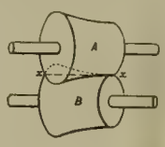
The pillow block B′ having thereon journal boxes b b, gear housing C integral with pillow blocks and supported thereon, gear wheels C C, and end plate A^3, having groves d d, and channels d′ d′, gear wheels C C being covered by gear housing and secured upon driving shafts B B, between journal boxes b b, and end of plate A^3.

PROCESS OF TREATING ZINC-BEARING ORES FOR OBTAINING ZINC, ETC. — No. 674,809; S. O. Cowper-Coles, London, England.



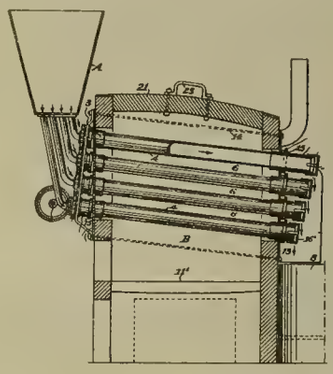
Process for the treatment of complex zinc ores, such as those known as "Broken Hill" ore, consisting in first roasting, crushing and screening ore, then placing it in vats and washing ore with water afterwards run into an evaporating pan, then leaching ore with a weak solution of sulphuric acid to subtract zinc and copper, then passing such solution containing zinc sulphate and copper sulphate through a body of carbon and an electropositive metal to recover copper, then electrolyzing remaining solution to recover zinc, again washing ore with water afterwards also run into evaporating pan, then treating ore with a solution of caustic soda to extract lead in the form of sodium plumbate, then electrolyzing solution to recover metallic lead, and then leaching remaining ore in vats with potassium cyanide and subsequently electrolyzing such solution to recover the metallic silver and gold.

ROLLER MILL FOR GRINDING AND CRUSHING.—No. 674,718; J. C. Wegeriff, Leigh-on-Sea, England.



Rolls partially superposed and having their axes lying obliquely across each other, in parallel horizontal planes and in different vertical planes, the rolls being of truncated concavo-conoidal or semi-hyperboloidal form, and both rolls being coned toward same side of the machine.

APPARATUS FOR SEPARATING METALS FROM THEIR ORES.—No. 674,563; W. A. R. Loose, Provo, Utah.



A furnace, a plurality of inclined muffles within furnace, means for feeding ore to muffles, closures for lower ends of muffles and adjustable with relation thereto to regulate discharge from muffles, a receptacle adapted to contain water into which ore is received from muffles, and an agitator within receptacle.

Alaska Copper Fields.

Near the head of the Klehini river, just off the Dalton trail, in British Columbia, lies the Rainy Hollow copper region, which was discovered late in 1898. Copper is found in bornite, chalcopyrite and malachite, occurring in veins from 18 inches to 2 feet in thickness. The assays of copper ores from this region run from 20% to 55%. There are indications that the deposits cover a great area. It is easily accessible to tide water and only 50 miles from a good harbor.

Kletsan creek runs through a region known for years among the Indians to be copper-bearing. Up to 1891 the region, however, was not investigated by white men. Copper is here found largely in the greenstones. The placer copper deposits are contained in stream benches through which the streams have now cut their courses. The placer copper is irregularly distributed on the bedrock and among the boulders. The Indians have worked the region but slightly.

A third belt of copper deposits was found between the Tanana and Nebesna. Copper pyrite was found in the greenstones, but not veins of native copper, as at Kletsan creek. Here also are indications of an extensive deposit, of which little is now known.

The two copper belts are each about 40 miles long, with possibilities of their extending in both an easterly and westerly direction. Future investigation will be required to determine the size and depth of the veins. If a railway were ever built into this region it will naturally be constructed from Valdez, which is 200 miles away. Such a railway might also give access to the reported copper deposits on the Chitna river.—Alfred H. Brooks in Report of the U. S. Geological Survey.

REPRESENTATIVES of the United States and Mexican boundary commission are making a voyage down the Rio Grande in three boats to take observations and make a more complete survey of the river. P. D. Cunningham, chief engineer of the United States commission, is at the head of the expedition. The party proposes to follow the course of the river from El Paso to the Gulf of Mexico, a distance of nearly 1300 miles. It will require three months to make the trip and for a distance of 600 miles all communication with the outside world will be cut off.

MINING SUMMARY.

Specially compiled and reported for the MINING AND SCIENTIFIC PRESS.

ALASKA.

Rich copper deposits on Prince of Wales Island are reported by S. I. Silverman of Spokane, lately returned from southeastern Alaska, after an investigation there in the interests of some Spokane, Wash., people who form the Alaska Development Syndicate. He says: "It is a country of surprises. I expected to see some good properties, but I was not prepared for the immense leads which exist on the islands. I was in Rossland during the early stages of its history, and it is no disparagement to the Kootenay camp to say that the showing on Price of Wales Island is far ahead of the early indications at Rossland. Much of the ore has a pure iron base, without a trace of silica, and of course it is an ideal smelting proposition. Values range about 5% copper, which is equal to $16. One ledge I saw, the Iron Crown, is from 200 to 300 feet wide, has been traced for a mile. The Hetta Mountain group carries ore showing almost solid chalcopyrites. The lode is a contact between lime and granite. Seven open cuts show that it extends for 3000 feet. Several assays give an average of 10% copper, with three ounces of silver and $2 in gold. The group is a grass root shipper. The vein is all the way from 2 to 20 feet wide. These properties lie on the west of Prince of Wales Island, in latitude 59 and are within 1 or 2 miles of tidewater. There is a fine harbor. The transportation question solves itself. As for the climate, it is much the same as it is along Puget Sound. Back in the hills there is snow, but along the coast the snow has long ago departed. The country is still in its virgin state. The Hetta group was located about two years ago. The Iron Crown was staked last January. It looks to me like a country with a great future."

At Juneau, Captain Ray, manager of the Cook Inlet Coal Fields Co., announces that that company can now supply all Alaska with coal. A 15-mile railroad from the beach has been built to the mine. Arrangements have been made for shipments to Juneau and Skaguay, and later the company will put on its own line of steamers.

J. Cronin of Fargo, North Dakota, one of the principal owners of the marble quarries near Shakan, on the north end of Prince of Wales Island, is taking fourteen experienced quarrymen to begin work on a more extensive scale. The marble is pure white and is said to be a fine grade for interior finishing and for tombstones.

About 230 miles inland from Valdez is the Chesna mining district. Here the Chesna M. & I. Co. is operating a placer mine, employing a large number of men. It has a sawmill and other necessary outfit for working the property. The discovery was made and the ground tested in 1899. It took all of that year to get the plant in and the ditches built before the freeze-up. The ground runs from 50 cents to $15 per cubic yard. The company has 660 acres. It has also discovered coal of a good quality for blacksmithing and heating purposes. It expects to use two nozzles on the ground this year and to handle 1000 yards of gravel per day. At present it costs about 50 cents per pound to freight into the Chesna district.

Slate Creek, Chesna district, is said to be very rich and considerable sluicing is being done there. About $15,000 was brought out from Slate Creek last year. The gold is high grade, averaging $18.70 to the ounce.

ARIZONA.

GRAHAM COUNTY.

South of the Marquita in the Cholas range of mountains, a large number of men are placer mining with dry washers. It takes four men to operate the large machines—one at the fan or bellows, two shoveling, while the fourth man removes tailings and looks after the riffle-board. After five or ten minutes' work the concentrates are removed and dumped into a pan, which is manipulated as if using water, the dirt and gravel being quickly thrown aside. Sometimes but a few colors are obtained; again, dust to the value of 50 cents or $1 is panned out, and exceptionally, nuggets weighing from $5 to $10 are found. The dry washers in this county are making from $50 to $100 each per month, and their gold dust is the money of the district.

PINAL COUNTY.

The Cochise M. & M. Co. has bonded the Chamberlain group, making a payment down. The company proposes to start work at once and to make a trial shipment. The ore in some cases runs as high as 42% copper, the average being claimed to be upwards of 10%.

SANTA CRUZ COUNTY.

A. C. Coffey and associates of Patagonia are now working eleven men on a strong well-defined ledge carrying lead-silver ores and some copper.

The Happy Jack M. Co. of Patagonia have developed a fine body of ore in a shaft sunk to a depth of 140 feet. They are now running a tunnel in the ledge to intersect the shaft, at a distance of 300 feet.

CALIFORNIA.

AMADOR COUNTY.

A company bonding the Evans & Fitzgerald gravel claim at upper Rancheria are preparing to work the mine on an extensive scale. A mill is to be erected for crushing the gravel, some of the machinery being on the way to the mine.

The Moon M. Co.'s copper property is situated on Jackson creek, in this county, about 7 miles from Ione. The working shaft is now down 50 feet, showing a 20-foot ledge of excellent ore. N. W. Mahaffey is manager.

Work is progressing on the Amador Queen No. 2 on a ledge just west of the Amador Queen No. 1; J. R. Phillips of Jackson is Supt.

The stockholders of Del Monte M. & M. Co. held a special meeting in Jackson May 15 and ratified the recent reorganization of the company. Work will be started on the new crosscut tunnel from the Calaveras river side, to cut four of the ledges on Del Monte ground at a depth of from 400 to 500 feet. At the same time the upper drift on Del Monte ledge will be worked to supply the mill.

CALAVERAS COUNTY.

The Lightner M. Co. has just paid a dividend amounting to $10,225.50. The company is now working 107 men. The mill of forty stamps is operated by electricity. The old original payroll of 1856, when the mine was operated by H. Adams, Sr., and J. Easton, is in the possession of H. Adams, Jr. At that time an arrastra was used to crush the ore.

INYO COUNTY.

The Burns & Anderson mine at Independence has been bought by H. C. Steele for about $10,000. Development work is now being done and mill is to be started soon.

MONO COUNTY.

The South End Tailings Co. of Bodie propose building a 10-stamp mill near the South End cyanide plant to do custom crushing.

NEVADA COUNTY.

The Yellow Diamond mine, near Grass Valley, owned by A. J. Ragon, has been bonded to outside parties represented by H. F. Morse of Amador county, who is opening it up. There is a tunnel on the property and a shaft, and by the first of June men will be at work cleaning them out. The company will put a new hoisting rig on the ground immediately.

PLACER COUNTY.

Development will soon commence on the Big John Hill mine, near Colfax. Water will be taken from the South Yuba canal. The mine is owned by E. Bigley and Mrs. Hinchey of Weimar.

The new owners of the Bob Lewis No. 2 gravel mine, near Forks House, are building a road from the Red Point grade to where their tunnel to mine the channel will be started.

SAN DIEGO COUNTY.

A company is said to be preparing to work on the Gold Crown group of claims at Picacho, owned by Capt. I. Polhamus of Yuma, J. Mendibles of Picacho and a number of Los Angeles parties. A $60,000 smelter is contemplated.

SANTA CLARA COUNTY.

Rich deposits of cinnabar ore have been discovered on Silver creek and are being developed by the Bradford Q. M. Co. A town is building at the site of the mine, and the postoffice department has promised to establish a postoffice. The county supervisors will provide at their next meeting to open a county road to the mine. The work of constructing the new roasting furnace will be completed in three weeks.

SISKIYOU COUNTY.

W. G. Tyrer, manager of the Cherry Hill quartz mine, Sawyer's Bar, is working fifteen men, taking out quartz and running the mill.

The Downing Con. G. M. Co. is operating near the Klamath river on Ash creek. From the tunnel in the mine $12,000 has been taken out of a pocket in 12 feet of ground. J. W. Downing is Supt.

Fernandez & Co.'s hydraulic claim, Cherry Creek, Sawyer's Bar, employs twelve or thirteen men, and it is believed will clean up about the last of June $10,000 more than the usual season's average.

E. Wallace has sold the Black Bear quartz mine at Black Bear to a Boston company for $160,000, John Daggett, the former owner, retaining a small interest. The ledge in the new shaft is from 2 to 20 feet in width and pays about $17 or $18 a ton. The new company intends putting on more men and will work the mine more extensively than ever.

TRINITY COUNTY.

A party of surveyors, consisting of H. L. Swain, H. D. Janett, R. B. Markle and F. Swain, are now surveying the ditch to bring water to the Sweepstake mines near Weaverville. They will be engaged in the work several months.

TUOLUMNE COUNTY.

H. Favot, L. Lebrun and C. A. J. Waterman have bonded to R. S. Enslow and A. M. Williams of Los Angeles, the Feliciana, Gringo, Long Hidden Treasure and Overlooked quartz mines, situated near Jacksonville, at $26,500.

Grading for the hoisting work and shaft at the Mack Con. G. M. Co., at Big Oak Flat, is completed and sinking commenced. The retaining walls of the new 20-stamp mill are completed and the mill timbers and iron work are being put in place. The concentrator building is all up. C. L. Lang is the Supt.

The Hornlein brothers of San Francisco and J. A. Mand of Milwaukee, Wis., operating over the Norwegian mine, near Tuttletown, are said to be considering the construction of a 10-stamp mill at an early date.

YUBA COUNTY.

Thirty years ago under a copper mining excitement hundreds of claims were located and twenty-six were being worked at one time in Yuba county. Fully $100,000 were expended by the locators in one year. In some instances large lodes were developed and ore was shipped for smelting tests. In the Yuba claim a shaft was sunk to a depth of 180 feet on a well defined lode of copper, and many tons were raised to the surface. This ore when hauled by teams 16 miles and then shipped to smelting works would not pay. But there are thousands of tons of copper ore in that claim and it can be mined at a low figure. A smelter located at the mine, similar to the works at Keswick, would produce profit.

COLORADO.

BOULDER COUNTY.

The Golden Eagle group of claims, consisting of the Golden Eagle, Golden Eagle No. 2, Golden Eagle Extension and Dorchester, is to have a new and complete outfit of machinery, sufficiently powerful to go down 1000 feet. The company owning the group is composed of Iowa men. J. T. Fitzgerald of Boulder is manager and J. P. Clark superintendent. The company has a tunnel in 1100 feet, and is both sinking and preparing to make an upraise.

The Caroline mine has been opened at Wall Street; G. Calberg, late of Cripple Creek, manager. The ore at the surface of the shaft runs $25. There is a 22 H. P. gasoline engine, a Freeman hoist and patent dumper on the mine. The shaft is going down 200 feet.

GUNNISON COUNTY.

The Grafflin M. Co. has commenced work on the Iron Cap mine at Spencer. The company expects to handle the low-grade ore in the mine.

HINSDALE COUNTY.

G. H. Martin, president of the Chicago Co., operating the Moro and Ajax claims, has been inspecting the property and preparing for the erection of a new mill. The mines show an immense body of ore, most of which will have to be concentrated. E. E. Chase, mining engineer of Denver, is making an examination of the mine and a test of the ore, for the purpose of deciding upon the kind of mill needed.

LAKE COUNTY.

Ex-Governor Anson Walcott of Indiana, principal owner in the Walcott M. Co., whose property is operated under lease by the Coronado M. Co., says the property is in splendid shape, and that preparations would be made for shipment of 100 tons daily. The Walcott Proprietary Co. owns twenty-one acres, extending from the Lucy B. Hussey to the South Park tract, with fine ore channels under the streets and alleys of the city of Leadville. Governor Walcott declares that he will carry up the case and fight it out in the Supreme Court of the United States.

The territory at Leadville which will be affected by the Supreme Court decision extends from the Elk and Lucy B. Hussey mines on the east, and near the West Carbonate fault, to the downtown and Capitol Hill properties on the west, a distance of about 1 mile. The streets and alleys included in this territory contain a total of about 200 acres. The following companies operating and shipping ore will hereafter pay royalties to the city of Leadville: The New Leadville Home M. Co., Home Extension, Bohn, Northern, Coronado, Fifth Street, Midas, Carribou, Orion, Welden, Cloud City, Maple Street, Downtown, Morocco. This territory has recently been developed and bodies of iron ore have been opened which will net from $5 to $10 per ton. There is also a considerable amount of steel iron, which is worth $4 per ton on the cars.

The Midas mines, with fifty-eight men, are producing 200 tons of iron oxide ores, carrying from ten to fifteen ounces silver, with 52% iron excess. An unexpected find is now being developed. In the O. Z. claim a new ore channel recently uncovered is making a large production, averaging twelve ounces silver and 50% iron. One stope is 50 feet wide, 40 feet high and 100 feet long, with no foot wall disclosed.

MONTROSE COUNTY.

E. C. Hamilton and L. W. Galloway, owners of the Copper Queen group, near Paradox, are erecting a mill. The process to be employed is lixiviation, the principal ore value being uranium. The Sunrise group, in Paradox valley, owned by these same parties, has been leased to Ouray parties, who have already begun active operations.

PARK COUNTY.

The Fanny Barret mine of Alma district has again resumed operations under the Fanny Barret Mines Co. of Denver, who have bonded it. It is an old producer credited with a production of nearly $1,000,000, all taken out in a comparatively brief period. The mine was worked up to 1893, but since then has been closed. A. M. Rucker has been appointed manager, and work has commenced in clearing out the old workings and getting the property in shape for production.

PITKIN COUNTY.

The first shipment of ore from Red Mountain district has been made from the Nellie Mack mine. The existence of ore in the Red Mountain district, disputed by experts, has been proven by J. McVeigh, who, persisting in development, has opened a big body of ore in the contact formation. He has fourteen men sinking and taking out ore.

SAN MIGUEL COUNTY.

The Ophir Con. Co. has begun the construction of its new mill and tramway at Ophir Loop, Telluride. The mill, of 100 tons daily capacity, will be equipped with crushers, rolls, 1050-pound stamps and Wilfley tables for the primary treatment of the ore. The secondary and final treatment will be by Huntington mills and Frue vanners. The character of the output points to this method as the most effective and profitable. A large amount of second class ore, running from $15 to $20 per ton, has accumulated on the Silver Bell and Butler dumps during the past ten years, which will be milled as rapidly as possible.

SUMMIT COUNTY.

It is said that M. M. Howe has successfully negotiated the sale of the Galena Gulch mill to Chicago people. Two claims and the mill are included and the price is reported to amount to $30,000. The property will be known as the "Nil Desperandum," and will be operated with J. Olson as superintendent.

TELLER COUNTY.

The country from Bernard creek for 3000 feet is to be prospected with a diamond drill by the Metallic G. M. Co. Its tunnel is now in 800 feet and before further advance the diamond drill is to be used.

The Consolidated Mines Co. has incorporated, capital $2,500,000, of which will be issued to the original companies 1,900,000 shares. The Bull Hill Con. will receive 900,000 shares, 600 shares of the new distributed to the stockholders for every $1000 of the old. The Consolidated Gold Mines stockholders will receive 1,000,000 shares.

The Wacu Weta claim of the Marroon Tunnel Co. has been bonded at $100,000 for twenty months.

The New Zealand Con. G. M. Co. has been incorporated, merging the New Zealand G. M. Co., the Trachyte G. M. Co. and the Compromise G. M. Co. of Cripple Creek; capital $1,000,000. Of the capital stock the New Zealand stockholders receive share for share on 600,000 shares out. The Trachyte receives 165,000 shares for the mine and appurtenances. The Compromise Co.'s capital stock of 30,000 shares is cancelled. The holdings of the new company embrace twenty-one acres of mineral-bearing ground. The officers are W. Woods president, H. E. Woods treasurer, F. M. Woods secretary and general manager.

IDAHO.

BLAINE COUNTY.

The shaft of the Tiptop mine, Hailey, is down to the 700-foot level. A station is being opened and as soon as the drifts are started each way the work of sinking will be resumed. It is the intention of the

management to continue to the 1000-foot level.

ELMORE COUNTY.

A strike has been made in the Homestake mine at Neal at a depth of 200 feet, a body of ore being discovered by a crosscut from the lower tunnel. This discovery is of importance to the entire district. It is understood that C. Balbach, the Supt., has ordered a raise through this ore to the upper tunnel level.

IDAHO COUNTY.

The shaft sunk 177 feet deep on the Delhi claim, on Shaw mountain, has cut the ledge, which is from 6 to 8 feet wide. The ore is not free, the gold being contained in iron pyrite.

W. H. Marshall for two years last past has been developing mines in the Carbonate Hill district, in the Seven Devils section. He says: "My partner, R. W. Stevens, and I have seven claims on Carbonate hill, which we have developed with a 60-foot tunnel. The ore body is of immense size and is rich in both gold and copper. All that district is now waiting for is the building of railroads. The Pocatello & Idaho Northern and the construction of the Little Salmon wagon road will afford relief, as ores that are rich enough to stand a short haul on wagons for the flux necessary to successful smelting will not stand a long haul over a rough country to the present terminus of the road. There are fully 100 men in the Carbonate Hill district, and perhaps twice as many in and about Cuprum."

The shoot recently struck in the Iowa mine at Quartzburg has been followed 150 feet. It is from 4 inches to 1 foot wide, the ore averaging $200 a ton.

KOOTENAI COUNTY.

A carload of ore shipped from the Conjecture, on Lake Pend d'Oreille, gave $1200 net after paying freight and smelter charges. The average was 115 ounces in silver to the ton. The returns are counted extremely satisfactory by officers of the company. The property is employing about eighteen men. A survey is to be made at once for a new tunnel, which would do away with hoisting.

OWYHEE COUNTY.

D. B. Huntley, E. V. Alford and T. Davey are about to begin development work on the Afterthought group on War Eagle mountain, near Silver City. They propose to sink a shaft and are arranging to put on a hoisting plant. These claims are south of the properties that the War Eagle tunnel is designed to develop. Mr. Huntley believes that the Golden Chariot vein runs south from the old properties on the mountain and has located the group on this theory.

F. Lepley, since last June, on the Lepley group at DeLamar, has developed some fine bodies of ore.

F. Irwin, superintendent of the work of the War Eagle Co. at Sinker Creek tunnel, states that the tunnel was now in 4100 feet and was being advanced at 9 feet a day towards completion at 6300 feet. He expects at about 5000 feet the tunnel will begin to cut some of the ledges that were so rich in the early days when mined nearer the surface.

R. H. Britt, Supt. of the Poorman mine at Silver City, says that his development work was following the old shoot and had opened up considerable good ore.

MONTANA.

FERGUS COUNTY.

Jones, Matthews & Miller have optioned the Mammoth group of claims, Gilt Edge district, to W. L. Lawrey of Rossland, B. C., reported to be the representative of New York capitalists. The option covers eight claims joining the Great Northern M. & D. Co.'s properties, and part of the great ore deposits on the porphyry carboniferous lime contact. The option is at sixty days, $100,000 in one year. The average assay values are about $8 per ton and mill tests show them adapted to cyanide treatment. Two shifts have commenced work on the ground.

The bullion shipment from the Kendall mine, in the North Moccasin, on May 18 was $5000. Work on the new mill by Finch & Campbell Co. will be commenced about June 1.

Lewistown, Mont., May 20.

The Blue Dick, Azurite and Pauper's Dream claims on Elk creek have been bonded by T. E. Collins, P. Gibson and P. H. Hughes to O. Schoenfeld of Great Falls, who has begun work. The bond is for $6000, until May 1, 1902.

LEWIS AND CLARKE COUNTY.

T. Hird, T. B. Garrison, W. F. Clarke and M. Mitchell of Spokane have bought the Ophir Nest and two other claims on Ophir gulch, near Helena. The ore assays from 16% to 18% in copper, with some silver and gold. The pay streak is from 20 inches to 2 feet in width. The ore is copper pyrite, with occasionally copper glance. The owners propose the sinking of a shaft 200 feet at once.

MADISON COUNTY.

The old Black Chief mine, near Pony, has been bought by J. W. Northey and J. Martin. The mine is a free-milling proposition, with a vein 3 to 8 feet wide, and assays up to $68. A large number of tons have been milled and a fair saving made; but cyanide treatment is required for the tailings. The new owners will put up a whim and sink on the ledge.

NEVADA.

ESMERALDA COUNTY.

A phenomenal assay is reported from Tonopah. It showed $17,520 gold, $560 silver. Between 6000 and 7000 sacks of ore of good grade have already been shipped.

The Vulcan Co. are said to have put on twenty-five more miners. It is reported that a large body of good ore was recently encountered in the lower workings of the Parrott mine.

J. H. Lee says his tunnel at Huntoon valley, near Hawthorne, has cut the ledge, finding quartz rich in gold. The tunnel is in 900 feet, and the ledge in the face 400 feet below the surface.

J. C. White, of Independence, Inyo Co., Cal., says of Tonopah: Butler postoffice will soon be in full running order. It is named for Tonopah's, discoverer. W. W. Booth is about ready to start his newspaper. From one to four carloads of merchandise and lumber arrive at Soda by every train for the camp. The chief shippers say that many more teamsters can find something to do, but freight rates will probably be reduced before long. The stages are loaded with passengers. The trip is made in two days, all in daylight. Building is going up as fast as lumber can be obtained. A mine owner was asked what his richest ore was worth, and in reply he pointed out two sacks valued at over $500. Water is still scarce. The springs are guarded, and water can be obtained in the town only. Living and team expenses are necessarily high. Water for a team for twenty-four hours costs a dollar, and feed is by no means cheap.

STOREY COUNTY.

The Ninnis brothers of Silver City have bought a one-half interest in the Cora J. and all of the Boer claim owned by the late J. Keiger.

WASHOE COUNTY.

The Copper Queen mine in Copper Gulch, near Reno, has been bonded. This property was discovered a year and a half ago, and a 60-foot shaft sunk on the ledge made a good showing of ore.

WHITE PINE COUNTY.

J. P. McOmie, W. N. McGill and W. G. Lyons, owners of the Maggie group near Robust, are sinking a prospect shaft 100 feet.

NEW MEXICO.

COLFAX COUNTY.

Two mill tests of ore from the Ajax mine, Elizabethtown, gave in amalgam $15.50 to the ton, the other $12.50. The tailings assay, after passing over the plates and concentrator, was $32. Other tests have proven it a suitable ore for cyanide treatment and a cyanide plant will be put in. C. C. Forrester is manager.

GRANT COUNTY.

Improvements are planned at the smelter of the Silver City Reduction Works to double the present capacity. A new furnace with a capacity of 200 tons is to be built.

A gold quartz discovery has been made near Central. For many years placers have been worked, and it is now believed that the lode source has been found. Some very high assays have been made, and the general average will run well up.

A. Wallis will shortly erect a small concentrating plant at Stein's Pass for the purpose of treating the concentrating ore, of which several good finds have recently been made.

The new 10-stamp mill of the Wilson M. & M. Co., at Stein's Pass, has been completed and tested satisfactorily. The 5-mile pipe line from the Animas valley, bringing the water supply, has been found to be too light for the pressure and has to be replaced before operations can be commenced. The new mill has a capacity of twenty-five tons daily. J. Rutherford is manager.

SIERRA COUNTY.

A strike is reported from near Rincon. A ledge carrying gold, silver and lead, assaying $54 a ton, has been discovered. Mrs. M. Ralph, J. W. Howard and J. Stewart, of Rincon, are the owners.

OREGON.

J. R. Cassin of Spokane, secretary of the Alamo Con. M. & M. Co. of Alamo, with Engineer F. D. Stanley is surveying the Alamo ground preparatory to raising from the 300-foot level to the upper workings and to outline the work for the erection of a stamp mill. The mine has been extensively developed during the last year and it is said to have a large amount of ore blocked out. The vein is 30 feet wide 300 feet down and carries free gold.

UTAH.

BOX ELDER COUNTY.

The Copper Mountain group, owned by the Lewissohns of New York, have begun the shipment of ores for trial.

JUAB COUNTY.

It is said that the Red Rose Co. have refused a cash offer of $150,000 for the Red Rose group at Tintic. V. McCune is manager.

SALT LAKE COUNTY.

The Wasatch King M. Co. has incorporated, capital $300,000. F. F. Stoll is president, and J. W. Langley, secretary. The company owns the City Rock and eight other mining claims in the Little Cottonwood mining district.

The directors of the United States M. Co. at Bingham have voted to erect a 1000-ton smelter from plans furnished by Mr. Fisher. Arrangements have been made for starting the construction, and it is estimated that about nine months will be required to complete it. Contracts will be let immediately. The cost will approximate $500,000. The smelting plant will be of the most modern type and combine the best features of the Bingham, Highland Boy and Boston & Montana smelters. Mr. Fisher has also introduced many new ideas and improvements of his own invention in connection with the plans.

TINTIC COUNTY.

An amendment to the incorporation of Tintic M. and Dev. Co. has been made, increasing capital stock from $1,500,000 to $3,000,000.

TOOELE COUNTY.

The Overland mine and mill, of which G. A. Duncan is manager and M. D. Stackpole Supt., is situated on the Sunshine side of Mercur district. This is a low-grade proposition, having large bodies of gold-bearing ore in a talcose-chert vein formation, between lime walls that stand from 10 to 18 feet apart. The ledge has a north and south strike, with a pitch eastward of about 15 degrees. The talcose material is next to the hanging wall, the chert lying against the foot wall. The talc appears much altered from ordinary talc, as if it had been calcined by heat. In this form it does not offer the resistance to percolation in the cyanide leaching tanks that usually comes from talc in its normal state. At all events, a mixing of the chert and talc in the vats renders percolation quite perfect, as the chert is a highly siliceous material. The values extracted consist of gold exclusively, the method being the simplest form of cyanide work, the ores requiring no roast. The leaching capacity of the plant is about 500 tons of ore daily, and at present the mill is operating at about full capacity. About 1800 tons are constantly in course of treatment, the time required for a given quantity to pass from crushers to waste dump being three and a half days. The values left in the tailings amount to from 20 to 40 cents per ton of ore treated. The ore is delivered automatically from the hoisting skip to the No. 5 crusher; thence elevated to supply bin at top of mill; thence through two No. 3 Gates crushers; thence through revolving screens, the oversize from screens returning to crushers; thence to ¾-mesh rolls and elevated to pulp bins, from which it is delivered by Jeffrey belt conveyers to the leaching tanks, the coarsest being ¾-mesh, though much of it is a great deal finer. The mine hoist and all mill machinery are run by electric power, transmitted 40 miles from the Provo plant. This power comes over the line from Provo canyon to Mercur at 40,000 volts, where it steps down to 5000 volts in transmission to Sunshine. At this mill are sets of transformers that reduce it to 220 volts for mill work. There are at the mine and mill thirteen motors, aggregating 350 H. P.

The mine is operated through a vertical shaft that sinks 450 feet, cutting the vein on its dip at that depth; here the shaft changes to an incline, following the dip of the vein 350 feet deeper. A skip holding nearly two tons of ore is operated between the collar of the vertical and the base of the incline, delivering from 300 to 325 loads of ore to the crusher floor of the mill every twenty-four hours. At the point where the vertical shaft strikes the ore body, at 450 feet depth, is what is called the 700-foot level, being at 700 feet depth from the surface on the dip of the vein. This level runs 1000 feet north and 600 feet south of the shaft and is provided with car trackage leading to the shaft, being the main hoisting level for the numerous sub-levels from the 700 up to the surface. One main shoot extends from this 700-foot level to the surface, along the foot wall, and is the channel through which all the ore from the upper levels is conveyed to the loading bin on the 700, and thence dropped into cars and taken to the hoisting skip. The method here is to run sub-levels on the vein both ways from the main chute, each about 100 feet above the other, then run upraises from level to level, blocking out the ore. There are forty-five of such raises. Then stopes, each about 40 feet wide, are carried upward, leaving pillars of ore standing for support. The ore stoped is carried in cars on the sub-level to the main ore shoot that discharges on the 700-foot level. From the 700 down to the 12th the same system prevails, except that each sub-level connects direct with the incline that carries the skip. On each of these levels is a skip bin, holding about thirty tons of ore, built right over the incline. By an excellent system of electric signals to the hoisting engineer the skip may be stopped on any sub-level and loaded automatically from the skip bin above it. Thus the ore is being broken down and hoisted from twelve levels that run on the vein at regular distances from near the surface down to over 1000 feet depth on the dip of the ledge. The material between the walls is practically all milled. WASCOTT.

Sunshine, May 24.

J. Burke left for Stateline last night, and will remain there until the new $80,000 mill, which is to be erected by the Ophir Co., has been completed. The foreman for Messrs. Dederichs & Burke, to whom the contract for the plant was awarded, is already upon the ground, where excavation has begun and with the orders for the material and machinery all in hand, no trouble should be experienced in completing the plant within the time specified by contract.

WASHINGTON.

FERRY COUNTY.

Olney & Blair of Republic worked four hours shoveling in sluices on the discovery placer claim near there, and made a clean-up of $100.

SNOHOMISH COUNTY.

The Sunset mine, at Index, is preparing to put in a compressor plant and air drills. When the flume and compressor plant are completed the 500-foot tunnel to cut the ledge 350 feet down will be started. The company are also considering putting on a diamond drill to more thoroughly prospect the several ledges at depth.

SPOKANE COUNTY.

It is said a smelter will be erected in Spokane if sufficient inducements are offered. P. A. Daggett, Secretary of the Montana M. & Dev. Co., says the company now owns 15 mining claims in British Columbia, northern Washington and Idaho, and has experts looking after promising prospects. Spokane is the central place for a smelter for these mines.

WYOMING.

CARBON COUNTY.

Over $2,500,000 have already been spent in opening up copper mines in Grand Encampment district. Eight new towns have been started—Encampment, Copperton, Battle, Riverside, Rambler, Rudefeha, Downington and Pearl. The last named is just across the State line in Colorado. They already have about 600 completed buildings in all, and represent in mercantile and other similar businesses more than $300,000 of invested capital. Seventeen steam plants have already been installed. Two concentrators, the only ones in the State, are now at work, and there is also a smelter at Encampment, the only one in Wyoming. The county recorder's books at Rawlins show several thousand mining claims located in the Grand Encampment country. By far the larger number have been developed only sufficiently to comply with the mining laws for holding. On several hundred claims work is being pushed, and among these are many that show excellent bodies of ore. It is estimated that nearly fifty prospects there could be paying mines if railroad facilities were at hand or local treatment of ores could be had. At present there are four mines shipping ore in quantity. These are the Ferris-Haggerty, Rambler, Evening Star and Cox.

FOREIGN.

BRITISH COLUMBIA.

Development work is being continued at the Athabasca mine, near Nelson, and the mill tailings will be treated by the cyaniding process.——The strike at the Silver King mine has been confirmed. It is claimed that the ore body is 8 feet wide and assays 120 ounces silver and 7% copper.——The May and Jennie mine is being developed, and a 10-stamp mill is being constructed. J. J. Fleutot is manager.——Work on the Noble Five, at Slocan, has developed the Last Chance vein.——The Black Prince group is leased to G. Gormely and associates, who are taking out some shipping ore.——At the Won-

derful, near New Denver, another vein 2 feet wide has been found. Assay shows values of 115 ounces silver.——The St. Eugene mine, at Moyie, has started up, employing 200 men.——The Eva group on Lexington mountain is being worked by the Imperial Dev. Syn. of Nelson. Large bodies of high-grade free-milling gold ore have been opened up. A. F. R.

Nelson, B. C., May 21.

The sale of the Giant at Rossland to C. H. Mackintosh has been made at about $175,000. Stockholders in the present Giant Co. will get stock in a new company at a rate of a little less than 7 cents a share. Mr. Mackintosh undertakes to form a London company, to be known as the Giant Mining Co., Ltd., with a capital of £200,000. A working fund of $250,000 will be placed in the treasury. The new company will commence work next month.

Reports from Ottawa state that the Dominion Government has decided to give a bonus of $5 per ton on Canadian refined lead to and not exceeding $100,000 in any one year. The bonus is to be available in the same way as the iron bounties.

The Canadian G. F. Syndicate will commence work at once on the Commonwealth group, on Hooker creek, near Nelson, which they bonded last fall. The ore carries gold, silver and lead. Considerable work has been done on the property, but the November storm last winter made it necessary to suspend until spring.

The official estimate of the last monthly mill run at the Ymir mine is: Eighty stamps ran 29 days 18 hours. The estimated profit on operating is $27,500.

The amount disbursed at Rossland by the mines in wages and supplies for April closely approximates $225,000.

CUBA.

"The mineral resources of Cuba are of greater variety and extent than has been supposed." So says C. W. Hayes of the U. S. Geological Survey, who has just made a reconnoissance of Cuba and the Isle of Pines. While there he visited Havana, Matanzas, Pinar del Rio and Santa Clara provinces. His assistants, T. W. Vaughn and A. C. Spencer, remain to complete the survey. In Matanzas province there are copper, iron and asphaltum, and on the Isle of Pines marble of exceptional quality, which includes the finer grade of monumental marble and building material. In Santa Clara province there are copper and asphaltum. Iron ore deposits are larger than those of Pennsylvania and compare favorably with the Lake Superior deposits. They are found along the coast near Santiago, very accessible to transportation. Copper was found in big deposits near Santiago, which were worked extensively until stopped by the ten years' war. In the same province are found almost inexhaustible deposits of manganese. The mining laws of Cuba open the country to American prospectors. Mineral locations can be secured on any part of the island, irrespective of the present ownership or occupancy of the land. The amount and shape of the claim is to be determined by the person making the entry. The cost of taking out a patent is $60 for an area of 500 by 1000 meters and an additional charge is made of about $1.50 per acre for additional mineral land. The fee covers the cost of survey.

KLONDIKE.

J. Hall has sold an interest in part of 17 above in El Dorado for $60,000. The interest conveyed is regarded as rich and the price obtained is not looked upon as high.

MEXICO.

The Cienegita M. Co., capital $10,000,000, has been incorporated by J. M. Ford and Col. W. Christy of Phœnix and W. H. Barnes of Tucson, to control a company owned by the same people in Mexico, which own concessions in Sahuripa, in Sonora, of copper mines that carry gold and silver. Nine groups of ancient mines are included. The company plans to construct a 200-mile railroad to Guaymas, to have ocean transportation. Reduction works will be erected at the mine, and matte will be shipped.

PHILIPPINE ISLANDS.

C. H. King of Oakland, Cal., has gone to the islands in charge of a large and well appointed exploring party to examine thoroughly the mineral and timber resources of the island of Mindanao for a strong syndicate of Eastern and California people. They propose, if the reports are satisfactory, to incorporate, with a view to developing on a large scale the mineral and timber resources, and engage in commercial exploitation as well. A steamship line is a part only of the plans yet in a formative stage. Among those interested and backing the exploration party are W. H. Talbot, F. M. Smith, J. A. Clunie, G. W. McNear, Sr., and W. G. Henshaw, all of San Francisco, Cal., who constitute the temporary Board of Management. Of this Board, Mr. Smith has been made treasurer and Mr. Henshaw secretary.

WEST AUSTRALIA.

The annual report of the Golden Horseshoe Co. shows 67,095 tons ore milled, yielding $1,315,000 in the mill; 33,418 tons of tailings cyanided yielded $390,200; 25,922 tons of slimes treated yielded $212,500; and 10,023 tons of sulphide ores and concentrates sold to smelters yielded $364,700, making a total value obtained of $2,282,400. The net profit earned was $1,400,300.

Personal.

R. O'BRIEN of Spokane, Wash., has returned there from Hornitos, Cal.

JOHN NUMAS of Plymouth, Cal., has been appointed foreman at the App mine, Tuolumne Co., Cal.

J. H. WEBER, M. E., of Oakland, Cal., has gone to Ely, Nevada, to make a mine examination for Eastern people.

JOHN EDDIE, formerly superintendent of the Pennsylvania mine at Grass Valley, Cal., has gone to Nome, Alaska.

THOMAS FRAZIER of El Dorado Co., Cal., has taken possession of the U. S. Land Office at Sacramento, Cal.

W. MCG. LOGAN, superintendent of the Old Home Con. G. M. Co. at Blue Tent, Nevada Co., is in San Francisco.

EDWARD SKEWES, formerly of Colorado, is examining mines in Ashantiland, West Africa, for a London company.

W. A. SHERMAN, who has been prospecting for oil at Bolinas, Cal., returned to Salt Lake City, Utah, on May 26th.

PERCY WILLIAMS, superintendent of the Century mine, Box Elder county, Utah, was in Salt Lake City, on May 27th.

PHILLIP MIXSELL of Idaho Springs, Colo., has been appointed superintendent of the Cashier mill at Breckenridge, Colo.

JOHN HAYS HAMMOND, who has been in California for some time examining mining properties, has returned to Denver, Colo.

W. MEIN of San Francisco has been appointed manager of the Roodeport Durban Deep G. M. Co. at Johannesburg, Transvaal.

J. E. BEVERIDGE, who has been in Mexico examining the Sivirojoa Mininm mines, has returned to his home, Salt Lake City, Utah.

B. S. REVETT of Breckenridge, Colo., has returned from Mexico and is now engaged in superintending the American Gold Dredging Co.

HENRY TURLEY is to be superintendent of the Black Queen mine, at Crystal, Colo., taking the place made vacant by the death of Amos Fraser.

M. CLEVE of Paris, consulting engineer of the De Lamare Syndicate, is at Atlin, B. C., directing the opening of the company's property at that place.

H. W. TURNER has resigned his connection with the U. S. Geological Survey and has engaged in practice as a mining engineer in San Francisco, Cal.

A. A. JOHNSON, general manager of the Columbia Hy. M. Co. of Atlin, B. C., is in Victoria, B. C., securing machinery for the mines under his charge.

W. T. FRAZIER, superintendent of the High Point mine at Stent, Tuolumne Co., Cal., is temporarily in charge of the same company's property at Lead, S. D.

F. M. ANDERSON has been appointed a field assistant of the State Mineralogist to make a report on the Shasta copper-bearing belt and has started at the work.

PROF. EBERHARDT FRAAS, a director in the Royal Museum at Stuttgart, Germany, is making an extended trip of geological investigation through Colorado.

MR. R. J. CORY, manager Denver office of the Edward P. Allis Co., has recently returned to Denver from an extended trip through Mexico and Arizona.

S. W. BOWERS, field assistant to the State Mineralogist, has gone to San Diego county to examine the section around Carisso creek with reference to its oil possibilities.

J. W. BENNIE has resigned the superintendency of the smelting department of the Mountain Copper Co. at Keswick and goes to Mexico to accept a similar position with one of the largest companies there.

Obituary.

GEORGE W. TOMB of San Francisco, whose death occurred in Sonoma county May 21st, was for many years prominent in the wire rope and cable business of the Pacific coast, having been identified at different times with the California Wire Works, the Washburn & Moen Manufacturing Co., and latterly with the American Steel & Wire Co.

Latest Market Reports.

SAN FRANCISCO, May 29, 1901.

SILVER—Per oz., Troy: London, 27½d (standard ounce, 925 fine); New York, bar silver, 59¾c (1000 fine); San Francisco, 59¾c; Mexican dollars, 50c San Francisco, 48¾c New York.

COPPER.—New York: Lake, 1 to 3 casks, $17.25; carload lots, $17.00; Electrolytic, 1 to 3 casks, $16.75; carload lots, $16.62½; Casting, 1 to 3 casks, $16.60; carload lots, 16.50. San Francisco: 18. Mill copper plates, 20c; bars, 22@23c. London: £69 1s 3d per ton.

LEAD.—New York, $4.37½; Salt Lake City, $4.00; St. Louis, $4.32½; San Francisco $4.90, carload lots; 5¼c 1000 to 4000 lbs.; pipe 6, sheet 6½, bar 5½c; pig, $5.25. London, £12 8s 9d per ton=2.70 cents per ℔.

SPELTER. — New York, $4.20; St. Louis, $3.75; London, £16 2s 6d per ton =3.58½ cts. per ℔; San Francisco, ton lots, 5½c; 100-lb lots, 6c.

ANTIMONY.—New York, Cookson's, 10c; Hallett's, 9c; San Francisco, 1000-lb. lots, 10c; 300 to 500 lbs., 11c; 100-lb. lots, 13@15c.

IRON.—Pittsburg, Bessemer pig, $17.25; gray forge, $16.50; San Francisco, bar, per lb., 2.65c in small quantities.

STEEL.—Bessemer billets, Pittsburg, $24; open hearth billets, $27.00; San Francisco, bar, 7c to 12c per lb.

TIN.—New York, pig, $26.00; San Francisco, ton lots, 30c; 1000 ℔s., 30¾c; 500 ℔s., 30¾c; less, 29c; bar tin, ℔ ℔, 34½c.

QUICKSILVER. — New York, $51.00 large lots; London, £9 2s 6d; San Francisco, local, $47.00 ℔ flask of 76½ ℔s.; Export, $45.00

MAGNESIUM.—New York, $2.90 ℔ ℔.; San Francisco, $3.75.

ZINC.—San Francisco, 5¼c; slab, 5¾c; bar, 7c; zinc dust, N. Y., 8c.

BABBITT METAL.— San Francisco, No. 1, 10c.

SOLDER. — Half-and-half, 100-℔. lots, 19c; San Francisco, Plumbers', 100-℔. lots, 15¾c.

PHOSPHORUS. — F. o. b. New York 50@60c ℔ ℔.

ASSAY LITHARGE.—San Francisco, 10c ℔ ℔, small lots.

BISMUTH.—New York, ℔ ℔., $2.25 50-℔ lots; San Francisco, $2.50 to $2.75 ℔ lots.

FERRO-MANGANESE. — Pittsburg, 80%, domestic, $62.50, large lots.

TUNGSTEN.—New York, ℔ ℔., 95c; San Francisco, $1.15.

FERRO-TUNGSTEN. — New York, 37%, 32c; San Francisco, 65c (60%).

NICKEL.—New York, 50@60c ℔ ℔.

PLATINUM.—San Francisco, crude, $22 ℔ oz.; New York, $22 per Troy oz

ALUMINUM.—New York, No. 1, 99% pure ingots, 35c; No. 2, 90%, 30c to 35c.

POWDER.—F. o. b. San Francisco: No. 1. 70% nitro-glycerine, per ℔., in carload lots, 15¼c; less than one ton, 17¼c. No. 1*, 60%, carload lots, 13¼c; less than one ton, 15¼c. No. 1** 50%, carload lots, 11¾c; less than one ton, 13¾c. No. 2, 40%, carload lots, 10c; less than one ton, 12c. No. 2* 35%, carload lots, 9¼c; less than one ton, 11¼c. No. 2** 30% carload lots, 9c; less than one ton, 11c. Black blasting powder in carload lots, minimum car 728 kegs, $1.50 per keg; less car lots, $2 per keg.

CAPS.—3x, $5.50 per 1000; 4x, $6.50; 5x, $8; Lion, $9, in lots not less than 1000.

FUSE.—Triple tape, $3.60 per 1000 feet; double tape, $3.00; single tape, $2.65; Hemp, $2.10; Cement No. 2, $3.00; Cement No. 1, $2.65, in lots of 3000 feet and up.

CANDLES.—Granite 6s, 16 oz., 40s., 10¾c ℔ set; 14 oz., 40s., 9¾c.

Commercial Paragraphs.

THE Ericsson Telephone Co. of 296 Broadway, N. Y., have received an order from which it appears that Ericsson telephones are in use in Deccan, India.

THE New Process Raw Hide Co., Syracuse, N. Y., has recently shipped one of its new process noiseless pinions to Germany to be used on the private yacht of Kaiser Wilhelm.

THE Edward P. Allis Co. have just closed a contract with Compania Minera de Penoles, Estado de Durango, Mexico, for the additions to this company's present lead-silver smelting plant. The new work will consist in part of six new blast furnaces, eight Holthoff-Wethey roasting furnaces, cooling and conveying furnaces, crushing rolls, and also two gross compound direct connected generating Corliss engines.

THE Sullivan Machinery Co. of Chicago have recently become successors to the M. C. Bullock Mfg. Co., and in future will manufacture the complete line of diamond drills, rock drills and mining machinery formerly put on the market by the two concerns. Two new buildings enlarging the plant have lately been erected and are now almost ready for use. Their Western agencies have been recently extended to the Pacific coast, and now in addition to the Denver office in charge of R. D. Hunter, a branch office has been opened in Spokane, Wash., under the management of M. J. Ready.

Books Received.

John T. Davis of Jackson, Cal., in writing what he names "History of the Mining Laws of California," as a part of a new "History of the Bench and Bar of California," has filled in a place left untouched by commentators and discussers of the law. What at least the older lawyers of California knew he has written in graceful words, and in doing it has given a service to lawyers all over the western half of the United States; for no one before him has taken the novel phases of mining law which have originated in California, and, bringing them together in historical sequence, written the story out. Mr. Davis' historical sketch will be a reference book for the younger lawyers and students, and is entertaining reading for miners who have yet to make an intimate acquaintance with mining law through litigation over the locus of a lode apex.

New Patents.

DEWEY, STRONG & CO.'S SCIENTIFIC PRESS PATENT AGENCY, 330 Market St. S. F., has official reports of the following U. S. patents issued to Pacific coast inventors:

FOR THE WEEK ENDING MAY 21, 1901.

674 834.—DENTAL CROWNS—Brewer & Burfeind, S. F.
674,533.—GOLD SEPARATOR — J. Broyles, New Whatcom, Wash
674,597.—LIFE BOAT—C. Buckel, S. F.
674,624.—AMALGAMATOR—J. V. Byers, Descanso, Cal.
674,757.—SADDLE BUCKING ROLL — F. R. Clark, Portland, Or.
674,731.—SUSPENDER END—C. H. Dome, Prescott, Ariz.
674,679.—BRAKE SHOE—Gilman & Brown, Tacoma, Wash.
674,504.—SAD IRON—T. F. Hagerty, S. F.
674,839.—ANCHOR—D. M. Hastings, S. F.
674,733.—STAMP AFFIXER—A. S. Heintz, Portland, Or.
674,609.—VALANCE SUPPORT—J. M. Higley, Niles, Cal
674,561.—GARMENT SUPPORTER—M. A. Irving, Victoria, B. C.
674,649 — FURNACE—S. A. Knapp, Hawthorne, Nev.
674,444.—SHAFT COUPLING — J. J. Kocher, Los Angeles, Cal.
674,563.—GOLD SEPARATOR — W. A. R. Loose, Provo, Utah.
674,650.—TONGUE HOLDER—J. A. W. Lundborg S. F.
674,445.—BRUSH CUTTER—L. Nilson, Fresno, Cal.
674,708.—CABLE GRIP—C. Noble, Sisson, Cal.
674,793.—EXPANSION B.T—E. North, Los Angeles, Cal.
674,516—DUST PAN—A. Olson, San Diego, Cal.
674,8.4.—WRENCH—W. H. Peters, Hoquiam, Wash.
674,566.—CASH CHECK DEVICE—Shirek & Lerond, S. F.
674,748.—CLOSING SPACES BETWEEN RAILS — E. Wadey, Los Angeles, Cal.
674,530.—CAN TOP—G. Wilcox, Los Angeles, Cal.
34,526.—DESIGN—A. Phillips, Seattle, Wash.

Recently Declared Mining Dividends.

	Payable.
Consolidated Mines Co., Colorado, monthly, 1 cent per share, $19,000	May 25
Osceola Copper M. Co., Michigan, semi-annual, $3 per share	June 21
Pacific Coast Borax Co., California, $1 per share	May 31

Notices of Recent Patents.

Among the patents recently obtained through Dewey, Strong & Co.'s SCIENTIFIC PRESS U. S. and Foreign Patent Agency, the following are worthy of special mention:

LIFE SAVING BOATS.—No 674,597. May 21, 1901. C. Buckel, San Francisco, Cal. This invention relates to a closed compartment vessel especially designed as a life saving and passenger boat. It consists of outer and inner concentric shells, an interior longitudinally suspended swinging compartment, with independent casings fitted to the ends of the vessel and having valve seats at their inner and outer ends. Guided ball valves move in the chambers by gravitation or pressure to close against either seat, one of said casings being removable to allow the passage of the anchor chain or cable.

APPARATUS FOR SEPARATING METALS FROM THEIR ORES.—No 674,563. May 21, 1901. W. A. R. Loose, Provo, Utah. This invention is particularly designed for the reduction of the carbonates and oxides of copper to metallic copper, though it is also applicable in other metallurgical operations requiring continuous treatment and where it is desired to apply the heat exterior to the containing vessel. It consists in the combination of a furnace, a plurality of inclined muffles within said furnace, and means for delivering ore thereto, the muffles in each horizontal row having their discharge ends projecting beyond the ends of those muffles beneath, and adjustable caps upon said discharge ends for regulating the discharge of ore.

MANIFOLD CONTINUOUS CASH CHECK DEVICES.—No. 674,566. May 21, 1901. S. W. Shirek, C. Shirek and F. Lerond, San Francisco, Cal. This invention has for its object the furnishing of a simple, cheap and compact apparatus wherein the

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carbon sheets remain stationary, the paper in multiple layers is drawn between the carbons, the original check or tag and copies torn off at one and the same time and the succeeding checks left in position ready for use without further manipulation. It consists of a case, closed at the sides and ends and open at the top, a detachable cover, the outer sides of which and the sides of the case are fitted one within the other, said cover having a transverse slot near one end, and a secondary cover detachably fitting the device and provided with a central opening.

ANCHORS.—No. 674,839. May 21, 1901. D. M. Hastings, San Francisco, Cal. The object of this invention is to prevent fouling of the anchor chain with the projecting parts of the anchor, and also to insure the anchor catching and entering the bottom whenever it is dropped. It consists in combination with an anchor including a central and diverging side shanks and connecting cross bars, a cable ring or shaft at one end, and a fluke at the opposite end. A slide upon the central shank has means for the attachment of a cable whereby the slide is movable along the central shank with relation to the center of gravity to assist in breaking the hold of the anchor.

GARMENT SUPPORTER.—No. 674,561. May 21, 1901. M. A. Irving, Victoria, B. C. This invention relates to improvements in devices for holding the bodice portion of the dress and the skirt together. It is designed to be easily adjusted or removed, to support any skirt, however heavy, and can be attached to any muslin shirt waist, however thin. The hook, being attached to the supporter, keeps all the strain off the belt; also, being attached to the supporter, it will not be laid aside or lost. Another advantage is it can be worn with any width of belt.

Reduced Rates to the Pan-American Exposition via Union Pacific R. R.

On sale June 3rd and 4th to Buffalo and return $87, account Pan-American Exposition; Kansas City and return $60, account Council Mystic Shrine; St. Paul and return $67.90, account Camp of Woodmen of America. Time of the Union Pacific from California to Buffalo is 3½ days. Tickets sold at all offices of the Southern Pacific and Union Pacific R. R. Co's. For full information in regard to rates and fast train service call upon or write to D. W. Hitchcock, General Agent Union Pacific R. R. Co., No. 1 Montgomery St., San Francisco.

INYO MARBLE COMPANY OF CALIFORNIA.—Location of principal place of business, San Francisco, California; location of works, Inyo, Inyo County, California.

Notice is hereby given, that at a meeting of the Board of Directors, held on the 27th day of May, 1901, an assessment (No. 34) of five (5) cents per share was levied upon the capital stock of the corporation, payable immediately in United States gold coin, to the secretary, at the office of the company, room 31, tenth floor, Mills Building, San Francisco, California.

Any stock upon which this assessment shall remain unpaid on the 8th day of July, 1901, will be delinquent and advertised for sale at public auction; and unless payment is made before, will be sold on TUESDAY, the 6th day of August, 1901, to pay the delinquent assessment, together with the costs of advertising and expenses of sale.

By order of the Board of Directors.

CHARLES E. ANDERSON, Secretary.

Office—Room 31, tenth floor, Mills Building, San Francisco, California.

ANNUAL MEETING.

The Regular Annual Meeting of the Stockholders of the National Cons. Mining Company will be held at the office of the company, 773 Mission St., San Francisco, California, on MONDAY, the 3d day of June, 1901, at the hour of 8 o'clock P. M., for the purpose of electing a Board of Directors to serve for the ensuing year, and the transaction of such other business as may come before the meeting.

GEO. W. FLEISSNER, Secretary.

Office—773 Mission St. San Francisco, California.

BRITISH COLUMBIA MINES.

Gold, Silver-Lead and Copper Properties. Excellent chance for profitable investments in legitimate mining in BRITISH COLUMBIA. Capital needed for developing promising prospects. A specialty made of FREE MILLING GOLD properties. Very promising FREE MILLING GOLD properties for sale; terms reasonable. Mines examined and reported on by reliable mining engineers. Correspondence solicited. Address Andrew F. Rosenberger, P. O. Box 700, Nelson, B. C.

WE BUY very rich Ores, Dental Scraps, Tellurium Ores, Mill Wastes, Jewelers' Sweeps, Gold Retorts, Old Iron Retorts, Base Amalgam, Quicksilver, Amalgamated Plates, Gold and Silver, Old Slags.

A. M. DONALDSON & CO.,
ASSAYERS AND WASTE PRODUCT SMELTERS,
1661 Larimer St., Denver, Colo.

Donaldson's Assayers' Slag Hammer { 1 lb. ..... $1.10 / 1 lb. 3 oz. $1.25

Quicksilver

BY THE FLASK OR CARLOAD.

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In accordance with the by-laws of that company, the Regular Annual Meeting of the Stockholders of the JAMISON MINING COMPANY, for the purpose of electing Directors for the following year and transacting such other business as may properly come before it, will be held at the office of the company, rooms 54-59, No. 120 Sutter street, San Francisco, California, at 2 o'clock P. M. on MONDAY, the 20th day of May, 1901.

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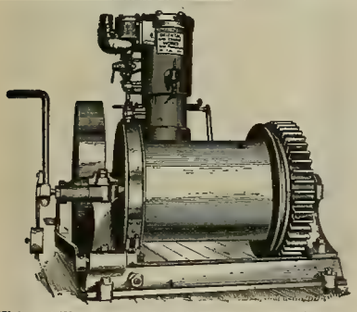

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15 Quick Elevators.
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Two of these mills were dry crushing, containing the following roasting and drying machinery:

Howell Improved White Roasting Furnace (60x27).
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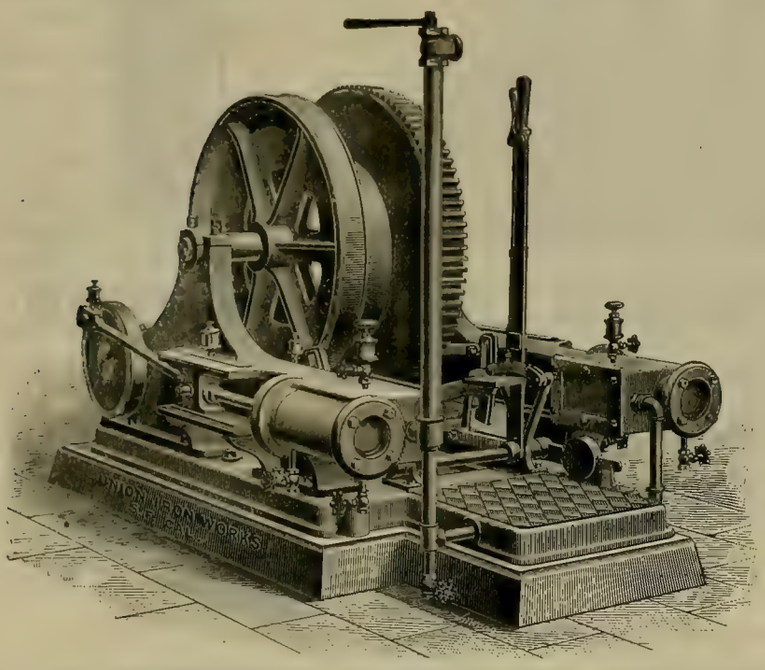

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50 Horse Power

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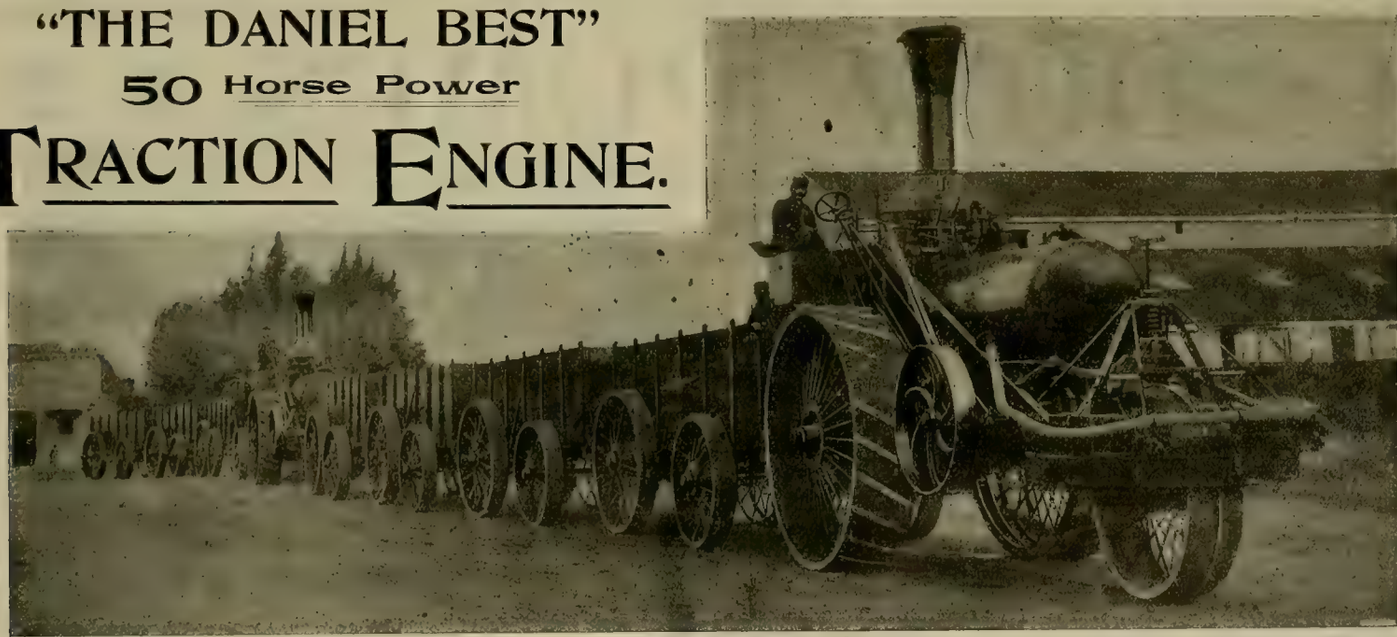

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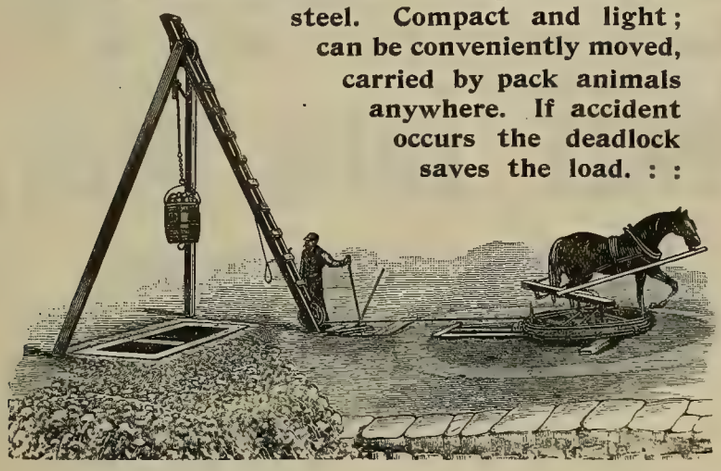

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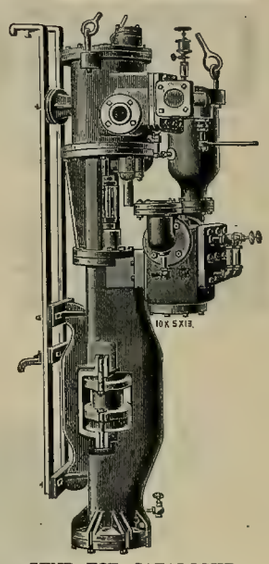

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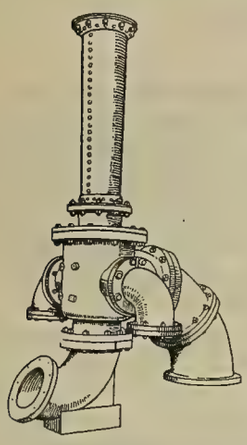

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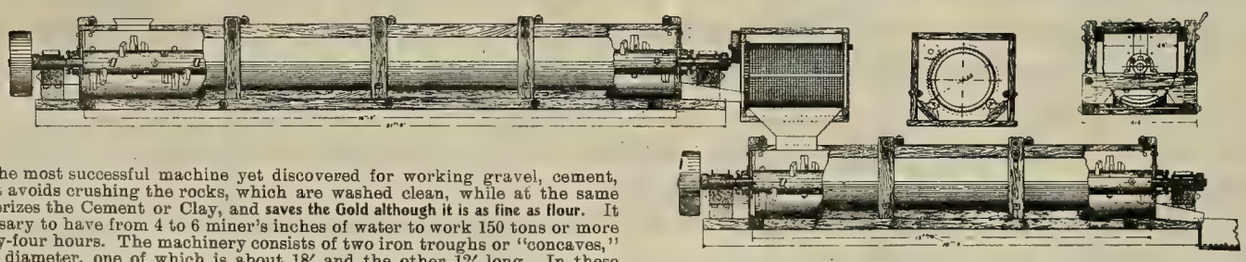

This is the most successful machine yet discovered for working gravel, cement, clay, etc. It avoids crushing the rocks, which are washed clean, while at the same time it pulverizes the Cement or Clay, and **saves the Gold although it is as fine as flour.** It is only necessary to have from 4 to 6 miner's inches of water to work 150 tons or more every twenty-four hours. The machinery consists of two iron troughs or "concaves," each 26″ in diameter, one of which is about 18′ and the other 12′ long. In these troughs are strong revolving shafts with projecting teeth, made of White Iron, 2¾″ wide by 1¼″ thick, placed in spiral form around the shaft about 2″ apart, forming a conveyor. The first shaft is geared to make from 150 to 250 revolutions per minute, and the second one from 300 to 500. There is a revolving screen between the two troughs that takes out the coarser rocks after being washed, and only the finer material runs into the second trough, and is there worked thoroughly. There is a space of about 4″ in the bottom of each trough, or "concave," that fills up with gravel and sand. When the gold is free it settles into this, and as the teeth do not disturb the bottom, the gold remains there until a cleanup is made. In many cases the 18′ machine alone is needed, as the two are only used where we have hard Cement or Clay to work. It requires from 10 to 12 H. P. to run the complete machine, and from 6 to 8 H. P. for the 18′ one alone. I also manufacture a 6′ machine about one-half the diameter of the others, and lighter in proportion, to be run by hand power, with small amount of water, and capacity of about two tons per hour. This can be easily moved from place to place.

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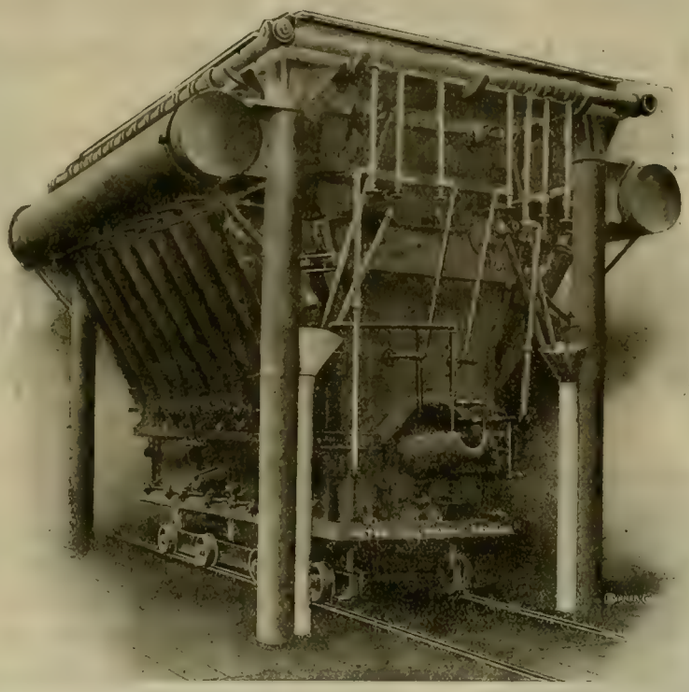

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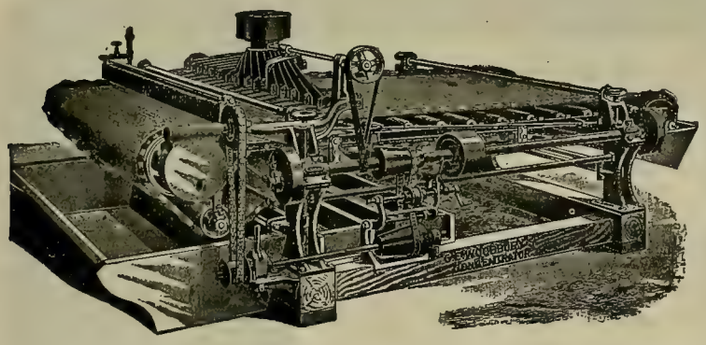

THIS Concentrator is superior to any other Belt Machine. It has an iron frame, steel shaking frame, and built in the most thorough manner. The patent distributing device distributes the pulp evenly over the whole working surface of the belt; thereby it enables the machine to perform perfect work, and giving more capacity to the Concentrator than any other Belt Machine. The variable eccentric crank gives the machine greater capability to work different classes of ore. I will warrant this machine as having more capacity than any other Concentrator.

Simple in Its Construction - Saves Fine Sulphurets - Without Loss in Tailings - Makes High Product - Capacity from 5 Stamps

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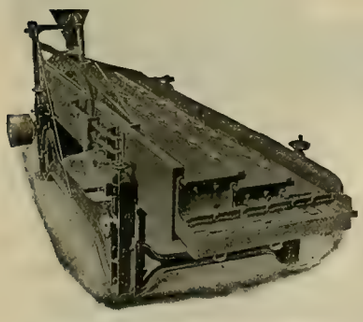
THE LATEST AND BEST CONCENTRATING TABLE.



A Few of Its Advantages:

- Wearing parts reduced to a minimum. All parts are interchangeable.
- Will take ore from finest mesh up to 6-mesh without sizing.
- A complete substitute for jigs, buddles, slime tables, belt tables, and all systems of complicated concentration.
- ESPECIALLY DESIGNED FOR SEPARATING ZINC FROM LEAD
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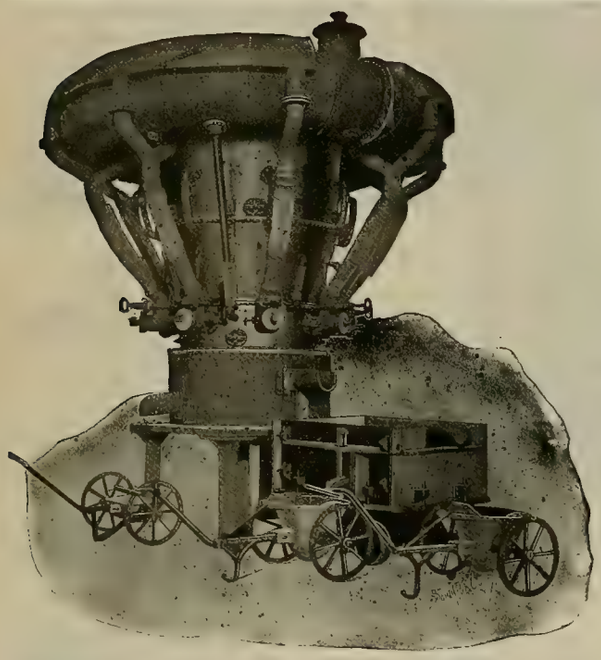

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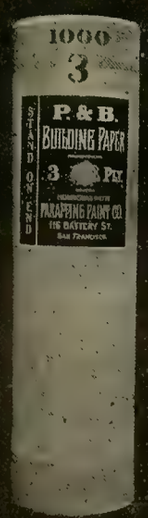

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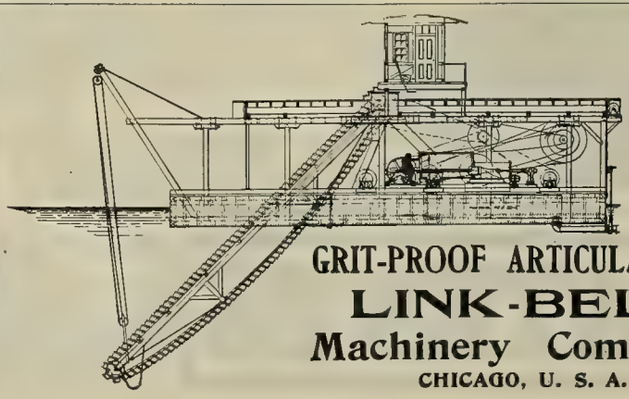

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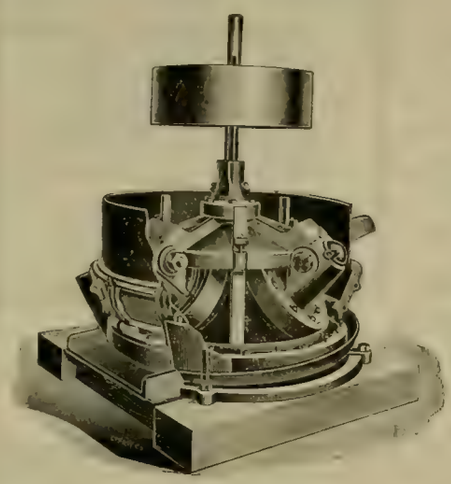

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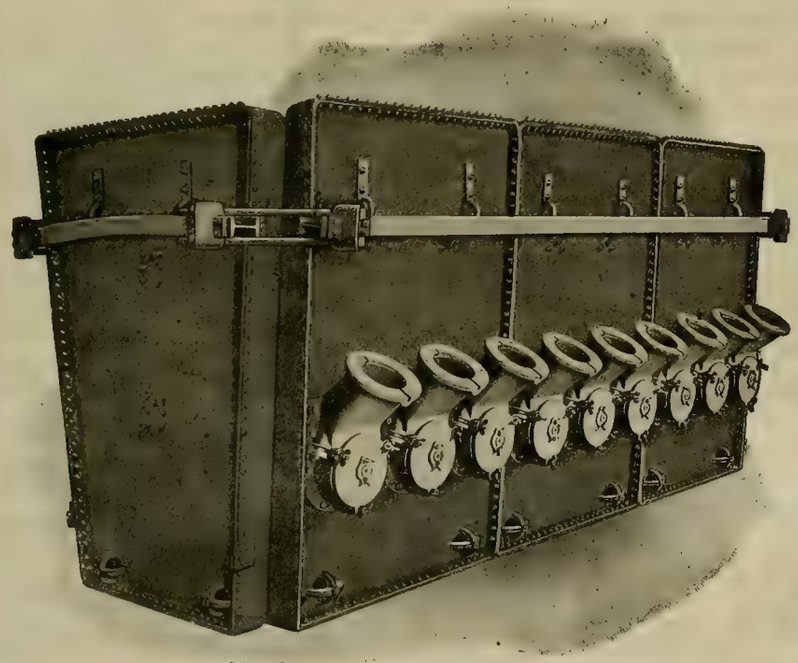

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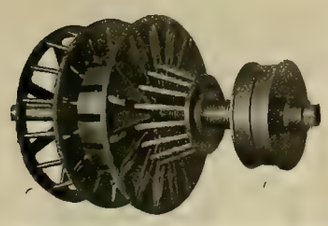

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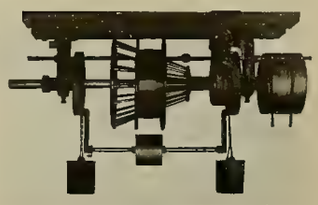

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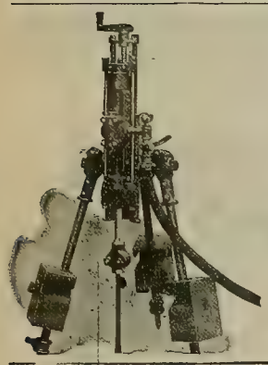

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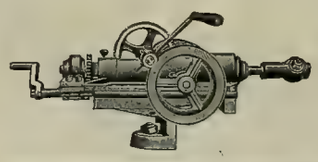

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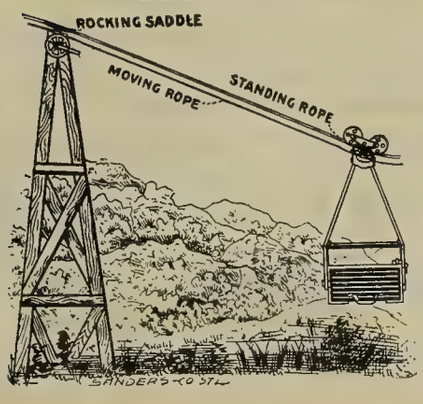

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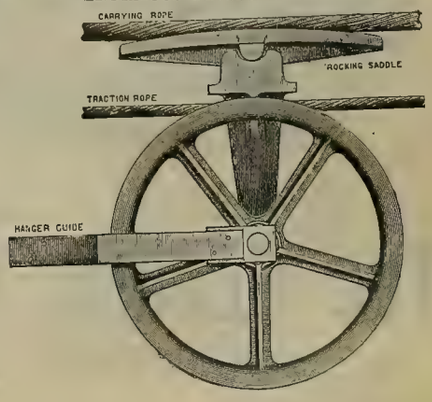

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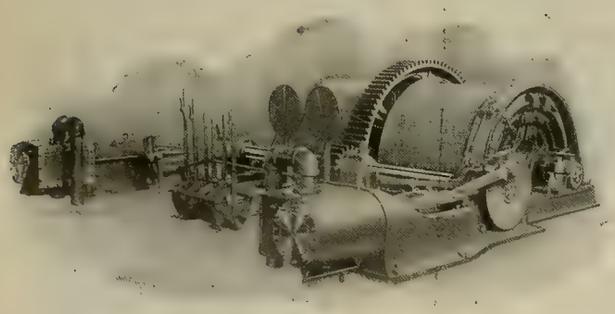

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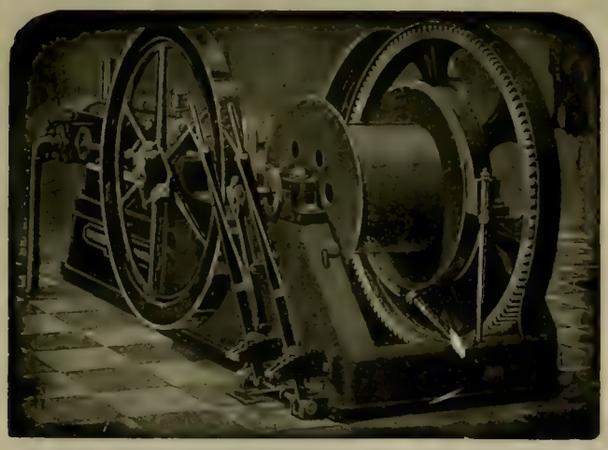

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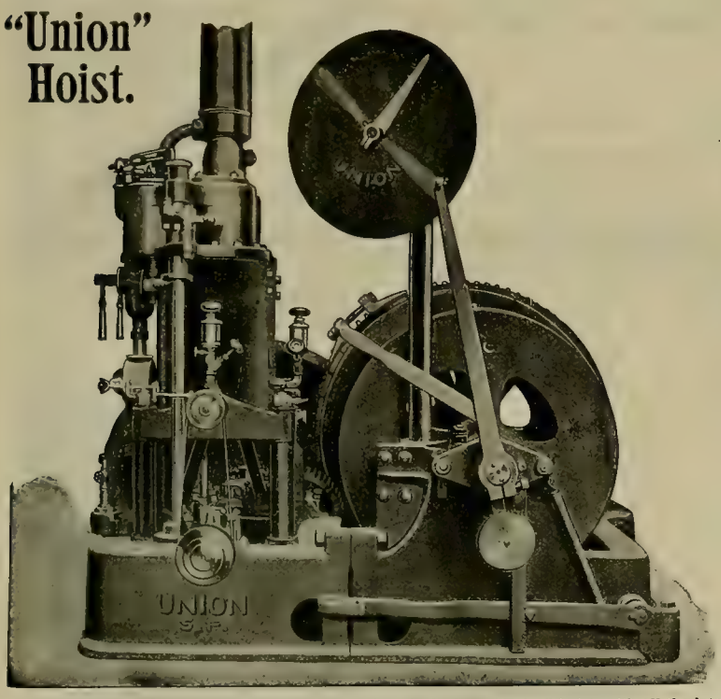

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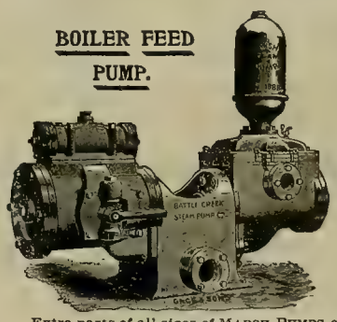

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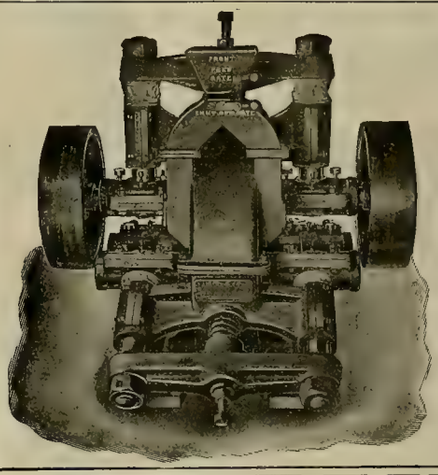

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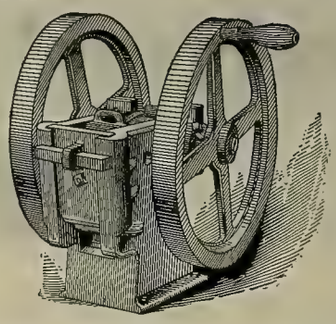

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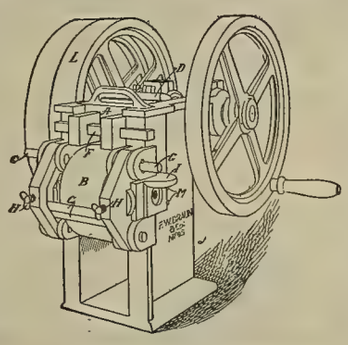

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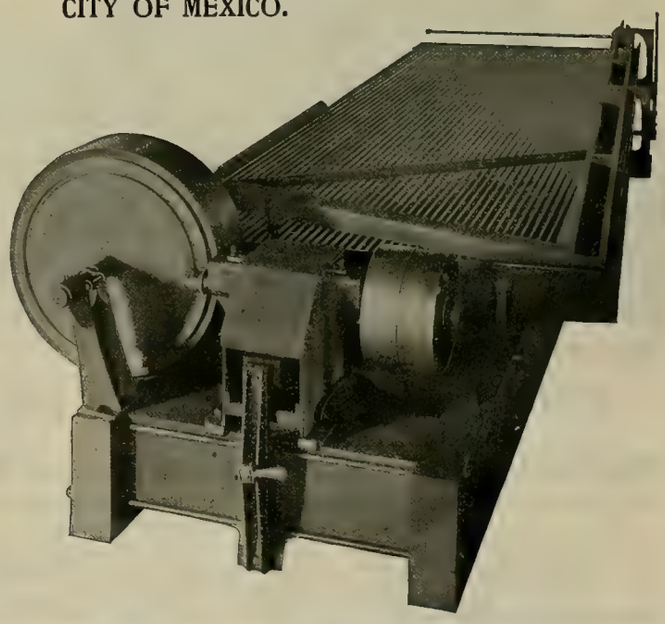

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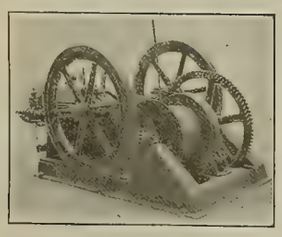

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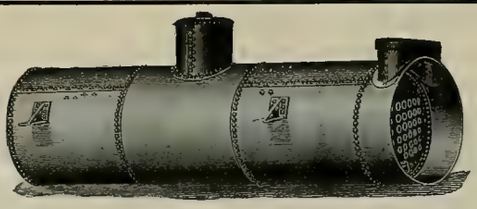

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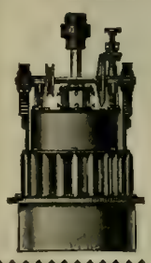

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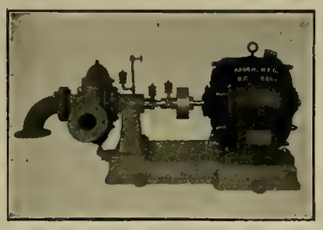

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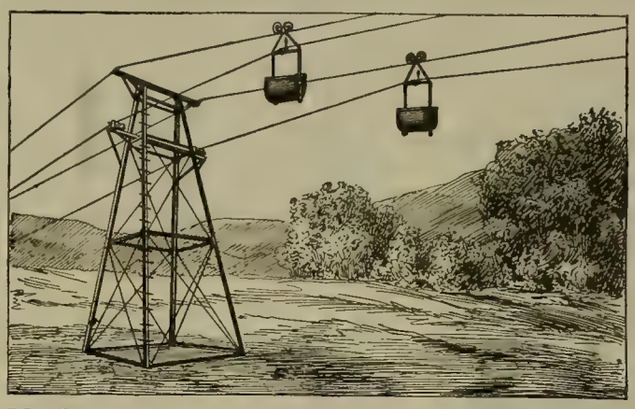

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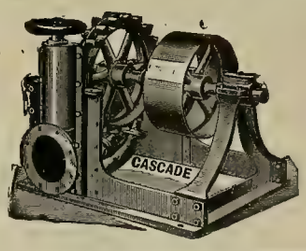

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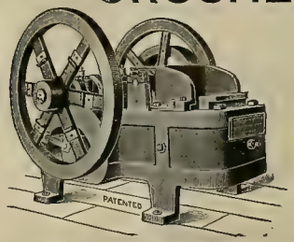

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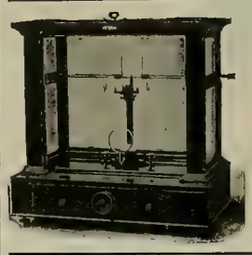

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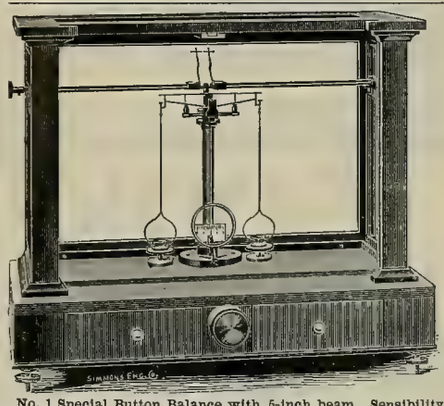

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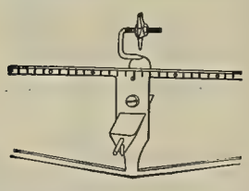

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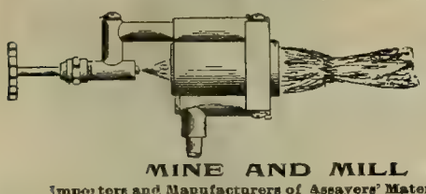

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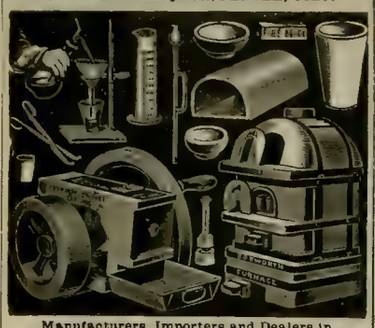

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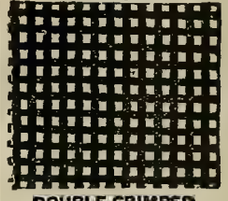

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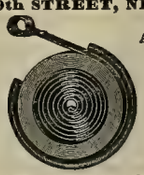

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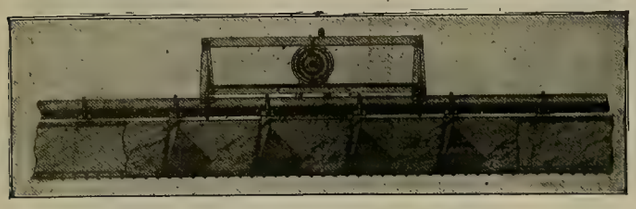

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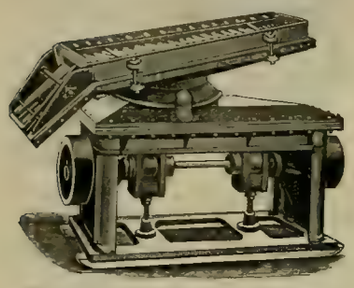

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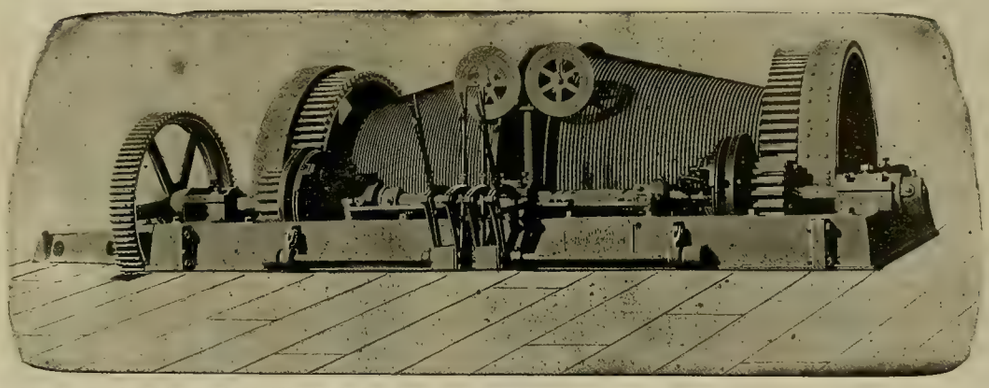

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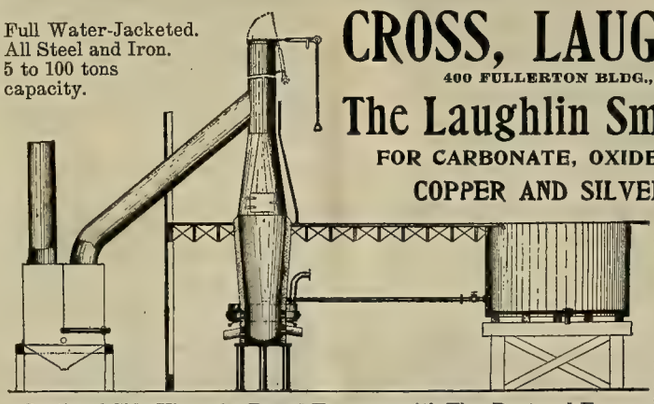

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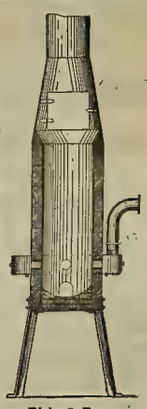

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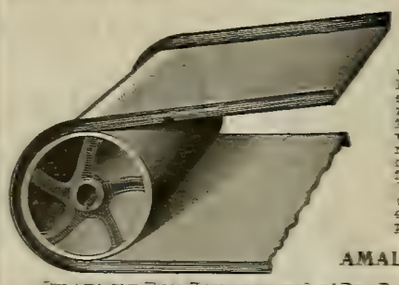

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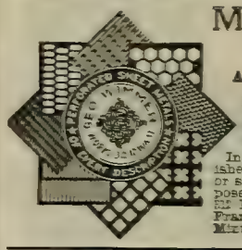

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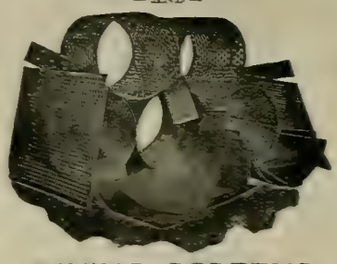

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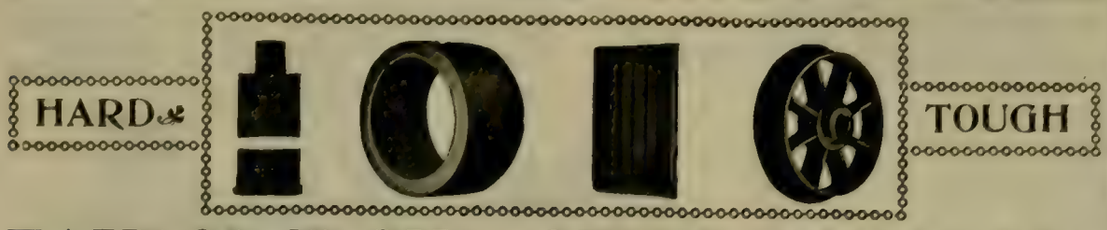

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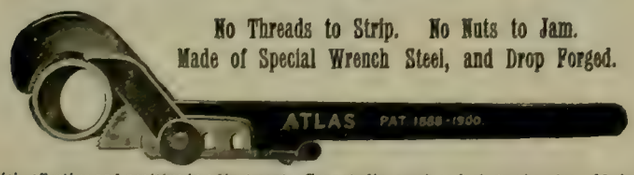

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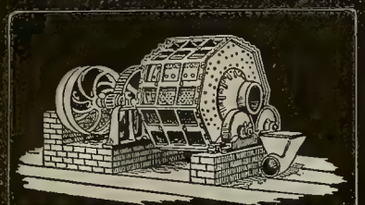

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MOHICAN MINING AND MILLING COMPANY.—Location of principal place of business, San Francisco, California; location of works, Tuolumne County, California.

Notice is hereby given, that at a meeting of the Board of Directors, held on the 16th day of May, 1901, an assessment (No. 1) of ten (10) cents per share was levied upon the capital stock of the corporation, payable immediately in United States gold coin, to the secretary, at the office of the company, 300 California St., San Francisco, California.

Any stock upon which this assessment shall remain unpaid on the 15th day of July, 1901, will be delinquent, and advertised for sale at public auction; and unless payment is made before, will be sold on WEDNESDAY, the 14th day of August, 1901, to pay the delinquent assessment, together with the costs of advertising and expenses of sale.

By order of the Board of Directors.

JNO. W. CLASSEN, Secretary.

Office—300 California St., San Francisco, California.

YUBA CONSOLIDATED GOLD MINING COMPANY.—Location of principal place of business, San Francisco, California; location of works, Nevada County, California.

Notice is hereby given, that at a meeting of the Board of Directors, held on the 10th day of May, 1901, an assessment (No. 1) of one (1) cent per share was levied upon the capital stock of the corporation, payable immediately in United States gold coin to the secretary, at the office of the company, Room 801, Claus Spreckels Building, San Francisco, California.

Any stock upon which this assessment shall remain unpaid on the 25th day of June, 1901, will be delinquent and advertised for sale at public auction; and unless payment is made before, will be sold on MONDAY, the 15th day of July, 1901, to pay the delinquent assessment, together with the costs of advertising and expenses of sale.

By order of the Board of Directors.

EDWARD H. STEARNS, Secretary.

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DELINQUENT SALE NOTICE.

SOUTH SLIGER GOLD MINING COMPANY.—Location of principal place of business, San Francisco, California; location of works, El Dorado County, California.

Notice.—There are delinquent upon the following described stock, on account of assessment (No. 1) levied on the 25th day of March, 1901, the several amounts set opposite the names of the respective shareholders, as follows:

Names.	No. Cert.	No. Shares.	Amt.
V. W. Grysler	6	160	$3 20
W. P. Keeney	7	500	10 00
W. P. Keeney	8	500	10 00
W. P. Keeney	9	100	2 00
C. W. Keeney, Trustee	13	200	4 00
C. W. Keeney, Trustee	14	200	4 00
C. W. Keeney, Trustee	15	1,000	20 00
Fred. Lass	19	1,000	20 00
Fred. Lass	20	4,000	80 00
E. W. Newth	22	500	10 00
F. W. Keeney	23	400	8 00
T. F Keys	24	500	10 00
D. K. B. Sellers	25	500	10 00
Fred. Lass	29	1,340	26 80
L. Ariani	31	250	5 00
V. Ariani	32	250	5 00
W. A. Mitchell	35	1,000	20 00
A. C. Baumgartner	38	500	10 00
W. A. Mitchell	42	2,000	40 00
Fred. Lass	43	500	10 00
Ira D. Orton and L. A. Maison	44	500	10 00
Ira D Orton and L. A. Maison	45	500	10 00
R. E. Starr	52	500	10 00
W. A. Mitchell	53	1,000	20 00
Fred. Lass	54	1,000	20 00
Fred. Lass	57	1,000	20 00
A. C. Baumgartner	58	1,000	20 00
A. W. Mitchell	59	1,000	20 00
Fred. Lass	61	1 000	20 00
C. W. Keeney	62	200	4 00
C. W. Keeney	63	200	4 00
C. W. Keeney	64	4,000	80 00
C. W. Keeney	65	2 000	40 00
R. W. Bender	66	2,000	40 00
L. Ariani	67	160	3 20
A. F. Baumgartner	71	400	8 00
W. A. Mitchell	72	500	10 00
W. A. Mitchell	73	500	10 00
J. C. Donnelly	76	1,000	20 00
C. W. Keeney	77	2,000	40 00
R. W. Bender	78	1 000	20 00
Jas. A. Kerr	79	1,000	20 00
A. F. Baumgartner	80	5,000	100 00
G. A. Conro	81	2,000	40 00
C. W. Keeney	82	76,100	1522 00

And in accordance with law, and an order from the Board of Directors, made on the 25th day of March, 1901, so many shares of each parcel of such stock as may be necessary, will be sold at public auction at the office of the company, Room 8, 402 Front street, San Francisco, California, on MONDAY, the 27th day of May, 1901, at the hour of 12 o'clock M. of said day, to pay said delinquent assessment thereon, together with costs of advertising and expenses of sale.

J. L. DANIELS, Secretary.

Office—Room 8, 402 Front street, San Francisco, California.

POSTPONEMENT.

The date of sale of the foregoing delinquent stock has been postponed from May 27th, 1901, to MONDAY, the 3d of June, 1901.

By order of the Board of Directors.

J. L. DANIELS, Secretary.

Office—Room 8, 402 Front street, San Francisco, California.

DELINQUENT SALE NOTICE.

OSCEOLA CONSOLIDATED MINING COMPANY.—Location of principal place of business, San Francisco, California; location of works, Plymouth, Amador County, California.

Notice.—There are delinquent upon the following described stock, on account of assessment (No. 11) levied on the 23d day of April, 1901, the several amounts set opposite the names of the respective shareholders, as follows:

Names.	No. Cert.	No. Shares.	Amt.
Pon Wand	51	250	$2 50
Pon Wand	55	250	2 50
Pon Wand	81	150	1 50
Pon Wand	87	500	5 00
Lu Chee	54	250	2 50
Jung Chee	57	250	2 50
George W. Warren	66	5,000	50 00

And in accordance with law, and an order from the Board of Directors, made on the 23d day of April, 1901, so many shares of each parcel of such stock as may be necessary, will be sold at public auction at the office of the company, 307 Montgomery street, San Francisco, California, on MONDAY, the 17th day of June, 1901, at the hour of 12 o'clock M. of said day, to pay said delinquent assessment thereon, together with costs of advertising and expenses of sale.

HOLLAND SMITH, Secretary.

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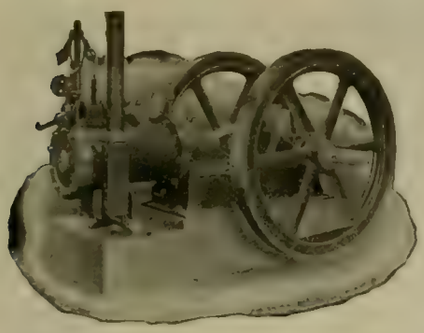

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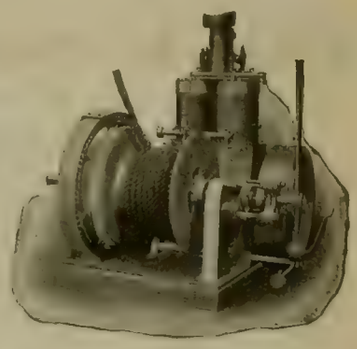

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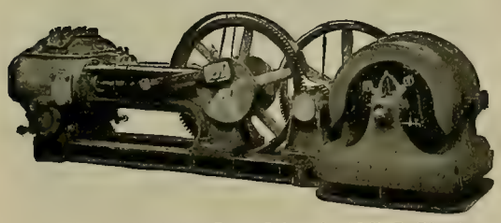

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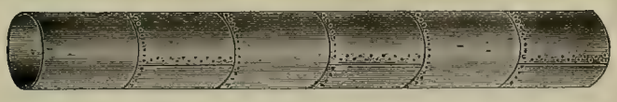

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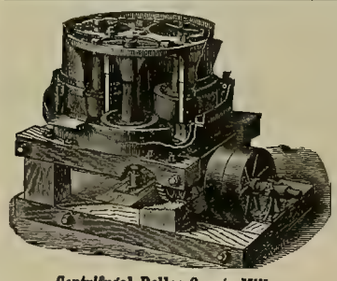

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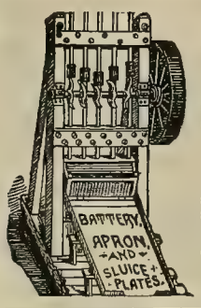

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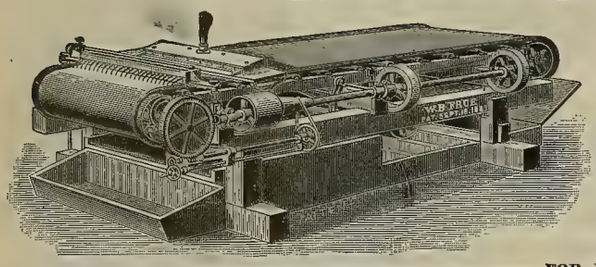

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The results obtained by this machine are the "acme" of concentration, and several cheap and untried machines that have lately come on the market compare by it. The manufacturers will tell you that they are "just as good, and cheaper," etc. The facts are that no other concentrator made has an equal capacity, or will yield as clean a concentrate with as small loss in the tailings as the Frue Vanner. The amount saved from the lower first cost of an inferior machine counts little in the year's results, when compared with the increased output from a Frue. This machine not only gives better results at both ends of the belt (i. e., clean product and poor tailings), but is operated at less expense and requires less attention than any other machine on the market. At the Alaska-Treadwell mine, where they have ordered over 350 Frue Vanners, one man attends 48 machines for 12-hour shift.

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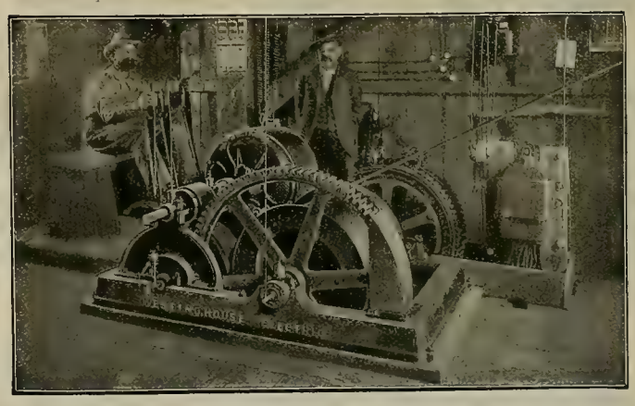

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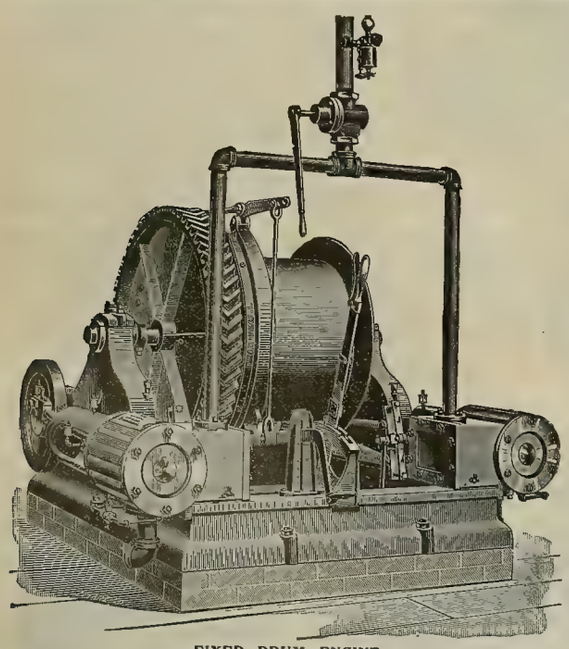

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MINING AND SCIENTIFIC PRESS.

Whole No. 2133.—VOLUME LXXXII. Number 23. SAN FRANCISCO, SATURDAY, JUNE 8, 1901. THREE DOLLARS PER ANNUM. Single Copies, Ten Cents.

Reservoir Dam Construction by Hydraulicking.

On this page is illustrated a reservoir dam constructed by the East Highlands Orange Co. in San Bernardino county, California. The dam is made of earth 65 feet high and 200 feet long by 40 feet wide on top. The construction was made by what is described as the hydraulic method, a novel engineering application of water developed in California placer mining.

In the kind of placer mining described as hydraulic mining, a large stream of water issuing in a jet under pressure made in a pipe line is thrown on a bank of gold-bearing earth or gravel, tearing it down and disintegrating it. The water then flowing away down hill, either in a natural channel or a specially devised box construction called a sluice box, is given such a grade that it carries with it the disintegrated earth and gravel, leaving behind obstructions on the bottom of the channel the gold that may be contained. No concern is taken of the earth or gravel carried away by the water, except to see that its accumulation does not destroy the carrying grade in the sluices and prevent a continuation of the mining.

In building a dam by the hydraulic method the matter of concern is to control the distribution of the earth and gravel, preventing its washing away, and effecting accumulation in a desired place. The carrying power of a stream increases rapidly with the grade. In practice the grade of the carrying sluice is made steeper than for gold washing, and the piping of the stream against the bank or, better yet, in the driving before it of the earth and gravel, the aim is to load the stream with all the material that it will carry—to "slum" the dirt, as the miners would say. The sluice boxes are so laid as to distribute the dam-building material over the base and to build from the center line of the completed structure. It is usual to plan both face slopes on lighter angles than when the material is distributed dry, and to provide for a width of finished top somewhat greater. There is rarely any difficulty in making the water slope on the desired angle. The water accumulates in a pool behind the rising dam and tends to compact it and to force the accumulation. On the outside the sluice is arranged to carry the least possible proportion of water, so as to reduce the tendency to slip downward and flatten as it grows higher. In the dam illustrated, a brush dam 20 feet thick was employed, but the earth used was fine and light, containing no gravel, and did not separate well from the water when the stream was spread and its velocity slackened. Frequently the dam-building material is so situated that the hydraulic stream is employed directly to drive it into place in the dam. In construction, instead of the clay puddle wall in the center a wall of sheet spiling is employed, or it can be omitted. The trunk outlet should go through a tunnel to one side of the dam. An earth dam constructed by this method is tighter and more substantial than when constructed dry. The settling and compacting is done simultaneously with its building. Voids and seams are all but impossible. In cost it is most certainly a cheaper construction. In specially favorable circumstances the material has been excavated and put in place as low as 10 cents a cubic yard.

Dam Built by the Hydraulic Method in San Bernardino County, Cal.

Another novel application of this hydraulic method of earth-work construction is in building railroad fills in mountain country where the streams have rapid falls. The plant, consisting of a string of pipe, a "giant" and sluice boxes, is a portable property. Neither ditch nor road construction is required.

Opening a Mine Level.

The illustration on this page of a level opening is typical of the change in mine practice made during the last few years, lightening the labor of miners. The cut is from a photograph of a Rand drill at work in the 500-foot level of the Keystone mine at Amador, Cal.

Opening the 500-Foot Level Keystone Mine, Amador, Cal.

MINING AND SCIENTIFIC PRESS.

ESTABLISHED 1860.

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SOUTHERN CALIFORNIA.

W. D. CURTIS.....223 W. Second St., Los Angeles, Cal.

San Francisco, June 8, 1901.

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THE use of a real war over possession of a mine is not going to be overlooked when it comes to advertising the mine. The smoke of battle is hardly off of the asphalt mines in Venezuela before an American in Mexico is reported as arming his mine workmen to drive off invaders.

THE report of the Master of Chancery to the U. S. Circuit Court in Chicago finding that electrolysis of water pipes had resulted from the leakage of trolley currents of electricity returned through the rails, and that the owner of the water pipes had good grounds for damages and recommending an injunction issue as asked, besides being good law, will, by forcing the installation of return wires for the current on all trolley lines, create a demand for copper that will tend to maintain prices for some time to come.

THE State Mining Bureau of California has announced the republication shortly of Bulletins Nos. 2, 5, 6, 9 and others on mine timbering, cyanide process, gold mill practices in California and mine drainages and pumps. It will be a graceful and appreciated act on the part of the writers to assist the bureau in giving these republications an added value to the mining industry by revising and bringing their excellent papers down to date. Much has been learned in practice since they were first published, particularly in the cyanide process.

THE United Verde mine, at Jerome, Yavapai county, Ariz., is to be assessed as having a value of $6,000,000, making an annual tax of $240,000. The assessment under the old law was $600,000, tax $24,000. The value of the mine, based on its income-earning power, has been rated at not less than $50,000,000. At this cash sale basis, the assessed valuation of $6,000,000 will be only 12% of the actual valuation, and the old assessment was only 1.2% of the cash sale value. Most mines are hardly so fortunate, and it is safe to say that other property in Yavapai county has never been assessed at so low a percentage of actual cash value. It would seem, however, that such a large increase in assessment valuation should lower the tax rate far below the 4% which seems to be the tax rate on the old valuation. There is no more aggregate of tax to be paid than before, while there is a larger assessment to pay it. The effect of the higher assessment will then be an equalization of the taxes. The mine will pay more and others less.

A Home for Old Prospectors.

On another page appears a communication from N. E. Linsley of Spokane, Wash., in which he presents with much force reasons why the old prospector, to whom the mining industry of the West is so largely indebted for its basis—the discovery of the mineral deposits—should have a home for his old age, from which failure to find fortune for himself should not debar him. The communication tells its own purpose better than comment on it can. The old prospectors are a class, from the necessities of their occupation, largely apart from the mining industry that follows their trails and builds up society on their mineral finds. Not all who, in the half century that has just gone by, have gone out into the wilderness in search of mines have found them for themselves. The vast majority have not. Those who have are no longer prospectors, but have become part of the society the wealth of mineral they have found has brought into being.

The nature of the prospector's occupation, its wandering character, its hardships, isolation, uncertainty of reward, have resulted in preventing the formation of those natural family ties which build homes and provide the place of refuge for old age. On the other hand, the cumulating years have destroyed or severed the life ties that the prospector had when he started out.

In their relation to the mining industry the prospectors are the advance guard—soldiers of fortune. As a nation we are caring for the declining years of the old soldiers who fought the battles forty years ago that, preserving our nationality then, have made possible what it is now. In doing so our people do not question the motives of those men then, the personal inspiration of their action in fighting. They know only that those men did fight, and now that they are old and fortuneless—it matters not why—and so the nation cares for them and has built and maintains many homes for them. It would seem as if the mining industry could spare from its abundance a home for its battered soldiers of fortune—the old prospectors. Many States have been built where they first marched and then invited thrift to follow. Many great individual fortunes have been built up by following in their steps. True, it is the prospectors who have not been successful that the proposed giving is for; but why not? Certainly they are the ones who need what is proposed to be given. Every army has a rank and file, and survivors are not all officers.

The principles of the suggestion made by Mr. Linsley this paper approves. It would like to see it taken up and seriously considered with a view to such action in the matter of details as discussion will indicate as best to meet the conditions. The suggestion Mr. Linsley makes as to a site for the home at Coloma, where Marshall discovered gold in California, is exceedingly felicitous. The surrounding of river and hill, dead piles of gravel from which the gold was washed out a half century ago, forsaken tunnels leading into ledges on the slopes, vines and fig trees, the old buildings of '49, roofless, but with the office signboards of the old days of gold still bright and fresh in the marvelous sunshine, the stage coaches that pass through it, make the spot ideal for the purpose suggested.

MINING to great depths in California and in similar vein deposits is an entirely different problem from such deep mining as is proposed on the Rand in South Africa. First, the character of the ore deposits is entirely different. The Transvaal lodes are mechanically-made sedimentary beds, the place of secondary deposit and concentration of gold originally in veins similar to the California veins. The result of the mechanical formation is a uniformity of deposit, the existence and gold content of which can be estimated on with absolute certainty in advance of providing the means for mining it. In true veins bearing gold, as the quartz veins of California, there is no certainty of values very far in advance of the mining openings at any time. Experience has shown their unevenness of gold content so conclusively that it is not commercially possible to plan works as far in advance as in the case of the Transvaal conglomerates. Again, the heat limitation is more certain to restrict operation close to the surface with the gold quartz veins. A third reason is the problem of handling water. In the Transvaal the quantity is small. In California quartz veins it is comparatively large and increases with depth. The veins are natural rock water channels, and additions to the flow as depth increases cannot be estimated on in advance. In conclusion, while deep mining in the Transvaal is a very reasonable proposition, because the profit and technical details can be estimated in advance, deep mining on the same scale in California or the Rocky mountains is not reasonable, because profit and technical details cannot be estimated on in advance. The best that is possible is to do just as California and Colorado miners are doing—take additions to depth a hundred feet at a time and be prepared to quit at any stage of advance.

THE American Smelting and Refining Co. has made another forward step in what this paper has pointed out was the inevitable effect of operation of the combination. The custom reduction mills and sampling works of Colorado have largely come under the business control, if not actual ownership, of the smelting corporation. The statement is made that the mill plants not yet absorbed will be, if wanted, as a consequence of the control of all the facilities of transportation held by the same people who control the smelting corporation. The industrial change is just announced. It is intended to effect economy as the smelting and transportation control view it. It is very probable that low grade ores will not have mill treatment or freight charges increased. To do so would reduce tonnage, which is what the smelters and transportation want. But a readjustment will be effected and the higher grade ores will be made to carry higher charges. The mine operator can refuse to mine or sell the ores, but that matters nothing to the combination, as it does not reduce tonnage to any amount that could cut smelter or transportation profits. The mine operator can refuse to mine and sell his high-grade ores, but very probably will not. The additions to the charges cut down his profit margin, but they do not wipe it out. The reduction in the profit margin reduces the capital value of his mine, but does not destroy it entirely. The mine operator, if a leaser, is able to pass the reduction in profit back to the owner by a diminished tonnage royalty payment. Readjustment of treatment and freight charges, as proposed to these people who own the best mines, is exactly the same as confiscation, without compensation, of a portion of their mines. There is not to justify it even the fiction of the service rendered costing more for high-grade ores than it does for low-grade ores. As a matter of fact it costs absolutely less per ounce of gold or silver produced, per ton of copper or lead produced, with high-grade ores than with low-grade ores. The readjustment coincident on the restriction of free contract on the part of the mine owner is thus in fact a confiscation. It is equally business and economy—from the smelter combination end of it. It is not the end of the action resulting inevitably from the combination, but it is a step forward towards it. The mine owners if they would meet this business of the smelting combination, which is confiscation to them, must take action on the same lines as the action against them is taken. They must associate as the beginning of action. Using the power that association gives they have then an advantage. It is easier for the mines to get new railroads and new reduction works than it is for the smelters and the railroads to get new mines.

THE great increase in the use of platinum, coupled with the fact that the production is stationary, or decreasing, is raising the price of the metal rapidly. It is now much more valuable than gold. British Columbia and California can both increase their production if the miners will undertake to save the small amounts recovered with placer gold. In British Columbia, in the Caribou district, the amount of platinum caught with the gold is quite considerable, and it certainly should not cost to save in parting from the gold at the mines but a fraction of what it now sells for. In the Klamath region of California the proportion with the gold is less, and miners say it has not paid to save when parting. Possibly that may have been the case when it was only worth $5 or $6 an ounce crude, but the value has appreciated so much now that the business of saving it seems commercially justified.

Concentrates.

A DISCOVERY of a diamond field is reported in New Zealand.

THE railroads have made a rate of one fare, plus $2, for transportation to the International Mining Congress at Boise, Idaho, meeting July 23, 24, 25.

MALTHA is the name by which are known natural hydrocarbons of the petroleum series that are between solids and liquids. The consistency is about that of tar.

THE mineral specimen from the gravel diggings of Sierra county, Cal., is not bort or black diamond. It is psilomelane (hydrous manganese manganate). The hardness of the particular specimen is exceptional. Textbooks give the hardness as 5–6.

FOR hastening the settlement of concentrates from a vanner belt in the box beneath the table a hammer automatically striking rapid blows on the side of the box is employed. This is used in the large Alaska mills and is there called the "Alaska kicker."

BENZENE is a mixture of hydrocarbons, the lighter oils distilling over first from petroleum, and commercially known as gasoline. Benzene is the hydrocarbon (C_6H_6) obtained in the distillation of coal tar. Despite the close spelling they are chemically and commercially different oils.

A GROUP of fifty mining claims is not necessarily a mine. More often than otherwise it is not. One deposit of payable ore on one claim will make a mine without the other forty-nine claims. Chances of having a mine are not materially increased by having a large number of claims.

WORK done on one claim in an adit which, if continued, would enter and develop a group of contiguous claims, is assessment work within the meaning of the law and interpretations which the courts have given it. For five claims it is necessary that the work done should amount to at least $500.

THE California State Mining Bureau does not make assays or quantitative determinations of the composition of mineral specimens. It will, on request, make mineralogical determinations of samples received from the State of California. Samples or minerals sent from outside of the State will not be determined.

A SUBSTITUTE for the steel cable in haulage of cars in long flat inclines has been proposed. A double rack is to be fitted to the sides of the shaft in which cogged wheels of a small carriage engage. The wheels are driven by an electric motor fed by a wire. The idea is to save the expense of lifting the heavy weight of cable.

A PENEPLAIN is a word used by geologists to indicate a region of light relief as to topography, the fixed result of denudation on a region of originally considerable topographical relief. It is generally used as the equivalent of a base level plain, one from the surface of which there can be no more erosion by the existing eroding agencies.

IN application for patent to groups of mining claims, where the work is all done on one, it is not necessary that the group should be embraced in one application. One or more can be patented in one application, and the remainder, one at a time or grouped, can be subsequently patented on their proportion of the original work that was done for the group.

DISCOVERIES of molybdenite are being reported from many localities. It is probable that very few are of sufficiently high grade to be commercially utilizable. The demand is not, however, so large but that an increase in supplies may lower sale prices without increasing consumption. It is a business condition that should be considered in estimating the commercial value of such finds.

THE telescopic object glasses used in surveying instruments are many of them what are termed eccentric. The instrument cannot be so adjusted that the intersection of the crosshairs will cut points in straight lines both horizontally and vertically. The difficulty is got around by so placing the glass in a transit instrument that all the error is in the horizontal line, and in a level instrument it is all in the vertical line.

ON the right to take timber from public lands for mining use there have been several interpretations made, the lines growing narrower as abuses have developed. The latest decision is by an Oregon court, which limits the cutting of timber on a claim to use on that claim alone. Where a group is being developed by one tunnel, it would seem that timber can be taken from claims the tunnel work is not on, but for which it is intended.

A CHEMIST writes us that he has used zinc shavings, such as are used in the precipitation boxes of the cyanide process, for the reduction of solutions of ferric-chloride previous to estimating the iron volumetrically with many advantages over the use of granulated zinc or any of the other methods of reduction. A complete reduction of the ferric-chloride can be made in six minutes. The shavings must be tested for impurities and corrections applied to the iron determination accordingly.

THE gold-bearing blue gravel underneath sandstone, near Hornbrook, Siskiyou Co., Cal., is not precisely the same kind of a deposit as the blue gravel under the lava deposits in the Sierra Nevada mountains. The former, though probably land-formed, subsequently became submerged beneath the sea, and covered with sand, which was ultimately compacted into rock. The blue gravel in the Sierra Nevada mountains has not been beneath the sea since its formation in place. It became buried beneath rock by the hardening on the land surface of the volcanic muds and lava.

THE use of perfectly dry steam and the elimination of condensed water would seem a very practical advantage of superheating. Water is a disturbing element in steam engines and steam pipes at all times. It increases the friction of the wearing surface, interferes with the lubrication, and chokes up the discharge; it produces unequal strains in the metal, due to different temperatures, and often gives leaks at joints which remain perfectly tight under dry steam.

THE following are recognized methods of distribution for electric light or power or both: Two-wire and three-wire systems for direct or alternating currents; multicircuit system for direct current multi-voltage system; single-phase, two-wire alternating current; two-phase, three or four-wire alternating current; three-phase, three or four-wire alternating current; composite system, direct current and single-phase or two-phase alternating current on same wires.

A PROSPECTOR is greatly assisted in his work by a knowledge of geology; not an expert's knowledge, or a knowledge of the names of rocks based on microscopic examination, but a knowledge of dynamical and structural geology so as to understand and apply it in connection with discoveries of ore deposits. The idea is to have sufficient knowledge to reason the facts of mineral occurrence as they come to a man in new ground looking for value in such deposits. The geological knowledge is a time saving tool.

POSSESSION of a mining claim in British Columbia, among other things, requires the possession of a free miner's license by the owner. If this lapses, the mine is forfeited. A form of relief is provided by a law of the last Legislature, which gives six months' time in which the owner by paying $15 may obtain a revival of his rights of ownership and a free miner's license. Where ownership is in a joint stock company the fee is $300. Under the new law all miner's licenses expire at midnight on May 31st of each year.

THE clearance in the cylinders of air compressors varies from one-fifth of 1% to 2% of the total piston displacement. The loss of capacity due to clearance varies with the pressure against which the piston is working. If the clearances are 1% of the volume of the cylinder and the pressure is six atmospheres, the loss of capacity due to clearance is 6%. If the pressure is ten atmospheres, the loss is 10%. If the inlet valve is set so as to open when the clearance air has expanded to atmospheric pressure, the only loss is the clearance space. If the valve opens at the extreme point, the air in the clearance exhausts through the intake and there is a loss of power as well as of capacity. The inlet valve should be adjusted to correspond with changes made in the pressure.

COAL OR PETROLEUM prospecting licenses in British Columbia are obtained by application to the Gold Commissioner in writing, in duplicate, accompanied by plans of the land and a fee of $50. A thirty days' notice has to be posted on the land and published in the official gazette and local newspaper for the same time. Not more than 640 acres square, and with north and south and east and west lines, is allowed. The license is issued for one year and extensions are granted for two years more. On proof of discovery of coal the land may be leased for five years at 10 cents an acre and 5 cents royalty per ton of coal or 1 cent a barrel of petroleum. Within three months of the expiration of the lease, on proof of continuous working the lessee may purchase the land at $5 an acre.

THE term paying so much per unit, employed in transactions with custom smelters, means payment so much for each 1% of the net metal or mineral after the smelter deductions for errors in assay or estimated unavoidable losses. For example: the new contracts offered miners by the American Smelting & Refining Co. offers payment for 90% of the lead in the ore as shown by assay. An ore, then, assaying 54% in lead, would for sale be the same to the seller as if it only contained 48.6%, and thus would be, in smelter language, 48.6 units. Copper in ores is subject to a deduction usually of 1.3%, or 1.3 units. So, if an assay showed 14% copper, the smelter would pay for 12.7 units. With some minerals there is no deduction made by buyers. The term unit originated in English metallurgy, but in the United States is being rapidly displaced by per cent.

TITANIFEROUS IRON ORES have been smelted and pig iron made. At the blast furnace temperature the titanium oxide is not reduced by carbon, but some of the titanium in very small proportions, .10 to .30 of 1%, or more, often only traces, alloys with the smelted iron. The pig iron containing this titanium is of extra quality, what is known as a forge iron, desirable for making steel by the open hearth process. The iron is very strong and has a close-grained fracture, resembling steel. The effect of the titanium in the metal is similar to that of nickel in hardening and toughening. The titaniferous ores, associated with magnetite and more or less with gold and silver-bearing pyrite and chalcopyrite, are quite abundant on Prince of Wales Island in Alaska. The situation is close to tide water and the conditions for cheap mining are more favorable than at the hard ore deposits of northern Michigan.

THERE is nothing improbable in the reported discoveries of a new "banket" gold reef area in South Africa, or, indeed, anywhere else. There is no reason to assume, in the first instance, that the Rand already discovered is the only possible one. Nature is not so selective geologically. It is possible for there to be a recurrence of the same conditions which originally formed the auriferous conglomerate beds of the Transvaal. It must be borne in mind, too, that such an area does not have to be a mineral-bearing area in the sense ordinarily understood. The gold-bearing conglomerate is simply an old coastal deposit, deriving its gold by water transportation, more or less land from districts, mineral in the ordinary sense. There are many localities containing known auriferous conglomerates, but very few in which the content is sufficiently large to make them mines. The newly discovered one still has that chance.

GEOLOGISTS have been gradually working out to the theory that the Glacial Period is divisible into two epochs. By this they mean that there was first a long period of glaciation, then a considerable time interval during which there was a recession of the glaciers northward and upward into the mountain summits, and finally a shorter period during which the glaciers again extended southward and downward, but for not as long a time interval as for the first epoch. Succeeding this last has come the present period. It is questionable if there were not many more divisions of condition in the Glacial Period. The glaciers of the southeastern Alaska coast during the last fifty years have been diminishing with great rapidity. Very many of them that within that period were known to discharge directly into the sea are now terminating back from the shore from 1 to 2 miles. Many of the smaller ones, farther inland, have withdrawn in clearly recent years far up toward the high summits.

VERY LITTLE of the so-called cheap labor in the Far East—in Siberia, China, Japan or the Philippine Islands—is really cheap labor. An exact statement of fact would be that day wages are low and hours of labor long. The labor is not efficient, however, and, except as to Chinese and Japanese, not particularly teachable. The Siberians have many holidays, which they insist on observing. They prefer their imperfect tools and time-wasteful methods to the better tool and time-saving methods. Philippines are much the same, but as the labor in that country is on agricultural production, the gathering of crops, the proportion of the sale value of the total created by labor is less than with mining, and its effect is not so commercially evident. Japanese are physically small, though exceedingly apt and responsive to instruction. The Coreans, physically larger and stronger men, command higher wages in Japan coal mines, as a result of their greater physical strength. The Chinese, considered from any point of view, are by far the best class of Asiatic laborers. They are fairly teachable and physically strong. They have no prejudices against hand tools of improved construction. Their vice is petty theft. It has been found hard to keep them from stealing parts of machinery, nails, screws, tools and trifling things of no great money cost but important to the economy of working at points so far distant from the base of supply. It would seem as if the contract system of work with native contractors and a holding of the contractors to strict accountability for theft losses would in the end prove the only effective method of doing industrial works of magnitude, particularly mining, in China.

THE practice of smelters in returning assays of sulphide copper ores carrying gold and silver is not uniform. What is returned is a partial analysis. Copper is given to the nearest tenth of a per cent; gold and silver in ounces per ton, iron and silica (SiO_2) to the nearest per cent, occasionally the former to the nearest tenth of a per cent. Sulphur, lime, aluminum, oxygen are not determined. Water is returned, but not as a constituent of the mineral. There must be some error in a return of assay which gives 5.3% copper, 24% iron, 52% silica, and .16 oz. gold, 4.2 oz. silver, the mineral assayed being a sulphide ore containing only chalcopyrite ($CuFeS_2$), pyrite (FeS_2) and quartz (SiO_2) with no iron oxides or copper carbonates at all. Magnetic oxide of iron, magnetite, could be easily recognized with a magnet in pulverized mineral. The percentages of copper and iron being given the rough check for error would be an independent direct determination of the sulphur by chemical analysis, or a preliminary test can be made approximately determining it mathematically. The sulphide mineral is a mixture of chalcopyrite and pyrite, the copper only existing in the chalcopyrite form. The percentage composition of chalcopyrite is copper 34.5%, iron 30.5% and sulphur 35.0%. With 5.2% of copper in the ore all in chalcopyrite the iron and sulphur of the chalcopyrite are determined by simple proportion: 34.5 copper : 30.5 iron : : 5.2 copper : (iron 4.6) and 34.5 copper : 35 sulphur : : 5.2 copper : (sulphur 5.3). Deducting 4.6% iron from 24%, the remainder 19.4% is the iron in the pyrite. The percentage composition of pyrite is iron 46.6% and sulphur 53.4%. Determining now the sulphur in the pyrite in the ore by the proportion, 46.6 iron : : 19.4 iron : : 53.4 sulphur: (sulphur 22.2). The sulphur in the mineral is then 4.6% in the chalcopyrite plus 22.2% in the pyrite, 26.8%. And the trial proximate analysis would then be the sum of 5.2% copper, 24% iron, 52% silica, and 26.8% sulphur, or 108%, which, being impossible, clearly indicates the probability of error in the partial analysis from which it is estimated.

A Home for Prospectors.

To the Editor:—Of all the great events of the nineteenth century, none are paramount to the discovery of gold in California in 1848. We were then a rather slow-going nation, with practically no capital to exploit and properly develop the country east of the Mississippi, to say nothing of the vast unknown country extending from St. Louis to Astoria, and from British Columbia to Old Mexico.

When gold was discovered in California in 1848, it took but a short time to proclaim the good news to all the civilized world, and less than fifteen months after the discovery parties of men from nearly all parts of the world were en route to the new Eldorado.

The news had aroused the latent force in man that enables him to overcome all obstacles—conquer the wild animals, subdue the Indians, build villages and school houses, and then look for other worlds to conquer.

They were a fine lot of men, physically and mentally, that started for California in 1849–50, and those who crossed the plains never recovered from that love of adventure and desire to see and explore, that they acquired on the trip.

After the year 1850 the States began to feel the effect of all the new dollars put into circulation, and our growth from that time on has been a marvel. A little gold was being mined in Georgia, but it was California first and the Rocky Mountain region later, that furnished the sinews of war, commerce and manufacture that made it possible for us to become the foremost nation of the world within the short period of fifty years. It is to the men who pioneered the great West that I desire to call your attention. What shall we do for them?

It seems to me that many of these men were created to blaze trails, make discoveries, and endure hardships, so that those who followed could enjoy all the comforts of advanced civilization. Many of these men have gone to the great unknown, and need no assistance from us. But there are many still living, who are from fifty to seventy years old, still prospecting and exploring. How they live would be a revelation to many who have become wealthy through the efforts, endurance and sufferings of these same pioneers and prospectors. With a saddle horse, a pack horse to carry from three to four months' provision, which consists of flour, bacon, beans, coffee, tea, sugar and salt for himself and his horses, a pick and shovel and a few cooking utensils—he nearly always uses tobacco, and sometimes has a dog for a companion—with $25 in his pocket and a few blankets to keep him warm at night, the prospector is equipped for a six months' trip into the mountains. He is full of hope—optimistic and visionary to the extreme. He starts out in the springtime feeling sure that he will strike it rich and make a stake before snow flies.

He leaves the roads and trails and strikes out for the unexplored country, examines closely every change in the formation, and, with his pole-pick handy, he breaks and examines everything that looks like ore, pans out the gravel along the creek beds for gold colors, endures all kinds of hardships, and 90% of these full season trips bring him nothing that will justify further exploitation.

Sometimes he strikes it rich and reports the fact to his fellow prospectors and a stampede is the result.

Washoe, Nevada, Virginia City, Montana, and a hundred other places that have produced a billion of new dollars, is the result of the indomitable and tireless search of the prospector. Sometimes the prospector gets a snug little fortune and retires from the field. But the majority of them are improvident, lavish with their money until it is all gone, then get some one to stake them to an outfit and again go to the wilderness in search of another fortune.

The pioneer prospector has nearly filled his mission in the United States, civilization has encroached on his domain until he is obliged to travel on railroads, eat at restaurants and sleep in beds. This all costs too much money for the "old timer," whose habits are as fixed as the very hills which have so many years been his domain. There will be plenty of prospecting to do for the next fifty years in the Rocky Mountain country, but it will be so different—the new prospector will need no packhorse.

But I am digressing; it is the old pioneer prospector that prompts this effort. He is now too old and feeble to continue in the fields. He has lived so long in the mountains with the trees, rocks, and wild animals for his friends and companions, that he feels unhappy and uncomfortable in the city, and much more so if he is "broke." He is unfitted for work on a farm or for sawing wood at the back door for a livelihood. He who has lived so close to nature so long, where the results of his efforts have been of such vast benefit to all of the North American continent, should not be asked to do menial service after he has given all the best part of his life in pioneering and prospecting the unexplored. What shall we do for him?

I would suggest a "Pioneer Prospectors' Home," located some place in California, not far from the place where gold was first discovered. Possibly the old ranch where gold was first discovered might be the very place to choose. However, this could be determined later by a committee to investigate and locate. I would suggest: First, a suitable location containing not less than 2000 acres of land, at least one-half of which would be well adapted to diversified farming, gardening and fruit growing, the other half to grazing.

Second, a comfortable building, or buildings, capable of comfortably accommodating 300 people, and a well-equipped hospital, good farm buildings, utensils, etc., suitable to properly farm, garden and dairy the entire 2000 acres.

How to raise funds to carry out the scheme would be the first and important step. I would suggest that contributions to the amount of $500,000 be solicited from wealthy mine owners, and others who have become wealthy directly and indirectly from the source of mines. Then ask the Federal Government for $500,000, and the Rocky Mountain and Pacific States each $20,000. Then an annual appropriation of $100,000 from the Federal Government. It appears to the writer that this should not be a difficult task or an unreasonable amount to ask for this worthy cause.

The 2000 acres properly managed should furnish all the vegetables, butter and milk, most of the fruit required, and a fair percentage of the meat and eggs. Those occupying the home, and able to do so, should be given some light duty to perform. Not compelled, the old prospector will volunteer and become interested, if treated right. I served three years in the army during the war of the Rebellion, and I have spent thirty-four years at mining in the Rocky mountains and Pacific States. The soldier who served his country in the army is no more entitled to a pension and governmental aid than these same pioneer prospectors who have spent all of the best part of their lives blazing trails and showing up the great mineral wealth of the nation.

Eligibility to the benefits of the Home could be determined through statistics, etc. A regent from each of the Rocky Mountain and Pacific States appointed to govern the Home could arrange that matter after due consideration. My opinion is that the applicant should first show that he had been a prospector for at least twenty years and was now unable to continue in the field.

When the Home is completed and ready for the prospector, let him come, not as a mendicant, but as an honored guest, and there, in his declining years, he will live in the past. In the wreaths of smoke from his pipe he will again see the stampede of excited prospectors and miners hurrying to some reported rich find. Again he will climb to the top of the highest mountain peak and feel sorry for the millions of people who have lived and died and never had one breath of fresh air like this. He will again be mending his shoes by his campfire and the pine squirrel will talk to him from the branches above. The waterfall, the beautiful lakes, the deep forest and rolling hills will all pass in review. Nature has kindly provided that the dark spots in his memory gradually disappear, leaving the bright ones brighter as he grows older. He has nearly outlived his usefulness, but he is entitled to a comfortable home far removed from the bill collector. Let him smoke his pipe and live over again those days of full vigor and manhood! N. E. Linsley, M. E.

Spokane, May 13.

Tamping Dynamite Blasting Holes.

To the Editor:—I have been very much interested in several articles which have recently appeared in regard to tamping giant powder in blasting rock. Now I know some miners will say the holes break just as well without tamping as with it; but, after saying that tamping in the case of giant powder does not mean a hole driven full of shavings with a mallet, as in the case of black powder, but only means a hole full of water or soft mud—in fact, anything which will make a tight joint and increase the resistance of the mouth or collar of the hole. I will illustrate by a case in which tamping proved very necessary:

When the U. S. Government sold the old cast iron cannon at Fort Point, San Francisco, to replace them with modern steel rifles, they were bought by foundrymen to be melted up and recast into other articles. They found that, however, being made of the best cast iron, they were quite difficult to reduce to a size that would go into a furnace.

Now comes the man with the tamping; he fastens a few pounds of giant powder on a stick, lets the cannon down into a hole in the ground lined with others like it, pours the cannon full of water, puts his powder inside the cannon, explodes it and finds the cannon in pieces that two men can handle.

Now, I do not say that more powder, without the water tamping, may not have broken the cannon the same way, but this shows the increased rending effect when tamping other than air is used. C. P. G.

Stent, Cal., May 26.

German papers report that H. Houbon, an Englishman, has discovered a process for making pure hydrogen from acetylene. He compresses acetylene in a Caillet steel bomb up to five atmospheres and ignites it with electricity. The acetylene decomposes into hydrogen and carbon, the latter precipitating in a fine soot. The process, it is claimed, is without danger, and it is possible to manufacture hydrogen on a large scale very much more cheaply than by present methods.

Salt Lake County, Utah.

[STAFF CORRESPONDENCE.]

A standard gauge railroad, operated by the Copper Belt R. R. Co., now extends from the Rio Grande Western terminus, in lower Bingham, up Bingham canyon to the mines of the Bingham Copper & Gold Co. The line is about 4 miles in length and will doubtless be extended up Highland gulch to the old Jordan & Galena of the U. S. group. At the upper terminus are the ore bins of the Bingham C. & G. Co., which receive the ores by gravity tram cars from the main tunnel. Self-dumping ore cars receive the ore from the bins through chutes, conveying it to the company's smelter in the Jordan valley. The Bingham C. & G. mine is one of the various properties which are under the general direction of Duncan McVichie. The holdings cover an ore zone which runs nearly east and west, with numerous cross veins. The main ore body stands at a considerable inclination from the vertical. It is opened by a series of drifts or levels along the vein at irregular vertical distances apart, all being connected by chutes and inclines. The top level connects with a tunnel that passes to the surface on the Highland gulch side; the lower level connects with the main ore delivery tunnel, which passes to the surface on the opposite side of the mountain that overlooks Bingham canyon. From the top level to the lower level is a depth of about 500 feet on the dip of the vein. At a point nearly half way between the lower and upper is what they designate as the seventh level, from which a very large tonnage of ore passes through chutes down to the lower or shipping level. This seventh extends several hundred feet along the strike of the ore body and has a large amount of trackage to the chutes and inclines. The intermediate workings are in the nature of sub-levels or drifts which follow the irregular formation of the ore shoots. The latter stand vertically in places, horizontally in others, widening out into great bunches frequently, as shown by worked-out chambers. The method of mining here is the caving system, thus avoiding the use of so much timber as is required by square sets or stulls that follow the usual method of stoping.

The original workings on this property were on the top level, where the ore was considerably oxidized, which condition extends down 100 feet or so below the upper, where there was considerable lead as well as copper. From that level down to the shipping tunnel, however, the ores are a copper and iron sulphide, bearing a varying proportion of copper and iron. In certain shoots the ores are very siliceous, running high in copper and low in iron; in others the order is reversed, in which the iron predominates over the copper, with very little silica, but carrying good values in gold and silver. The workings generally show that on getting below the oxidized belt the lead values largely disappear.

The U. S. group, whose holdings embrace half a mile wide by 2 miles in length, extend over both sides of Highland gulch, including the old Jordan & Galena and the old Telegraph groups. The plants on these two main groups form the basis of two sets of operations. This consolidation covers a great lime belt, 150 to 350 feet wide, standing between two quartzite walls. This lime belt dips to the northeast about 30° and carries a series of ore shoots, some of them parallel and others crosswise with it. The earlier stages of mining on these properties, extending from the '70s to the early '90s, were confined to the surface ore shoots, practically above the 200-foot level, the product being carbonate ores, bearing high values in lead and silver, the output in that period amounting to nearly $30,000,000. But now the proposition is one of mining at greater depth and opening the shoots of ore that carry an iron and copper sulphide, whose values in the main are copper, silver and gold. This belt or zone lies below the Bingham C. & G. body. It appears that the foot wall of the latter forms the hanging wall of the U. S. ore body. During the past year the work on the U. S. has been confined to development work, and it is stated by Supt. Mayberry that 14,000 feet of such work has been done in that time, opening up new ore bodies which are said to measure 300,000 tons, and that there is now in sight, as demonstrated by measurements, sampling and assays, over 1,000,000 tons of ore. All this new work has been opened through inclines and tunnels. A force of seventy men are kept employed. When the work of producing begins the caving system will be adopted.

It is stated that plans for a smelting plant in the Jordan valley are being made. The business relations of the U. S. Co. and the Centennial-Eureka, in Tintic district, are very close, by reason of many of the stockholders in both companies being identical, and the matter of providing smelting facilities for both properties is being considered jointly. Wascott.

Bingham Canyon, May 18.

Forest Endowment of Pacific Slope.

By Prof. J. G. Lemmon.

Mother Nature is wonderfully lavish with her favors towards some countries, and as strangely niggardly to others. No more striking proof of this fact is found than that of the distribution of the forests over the land surface of the earth. It is but little understood that the most wonderful and valuable forest known is that of Northwest America.

This forest possesses more kinds or species of resinous-wooded, needle-leaved, cone-bearing trees than any equal area in the world, and these trees are either the largest in dimensions or they bear the largest fruits, called cones, that the earth has produced.

This matchless combination of superlative qualities has been bestowed by circumstances and forces so wonderful as to give the phenomenon the character of a distinct gift or local endowment.

Passing by the non-resinous, broad-leaved trees, of which there is a liberal allowance, the resinous-wooded, cone-bearing trees of the Pacific slope number fourteen genera or families, comprising seventy species or all kinds of trees—thirteen of the genera with forty species being in California.

Of these species twenty-seven are pines, two are larches, five are spruces, two are hemlock spruces, two are false hemlock spruces, ten are firs, two are redwoods, two are American cedars, seven are cypresses, nine are junipers and two are yews.

Enormous Size of Trees and Cones.—Three of our pines—the great sugar, the yellow and the Jeffrey pine, all of them being very valuable trees, are also the largest trees of the family, often attaining a height of 220 feet, with a diameter of 10–12 feet—no pines of foreign countries attain one-half of these dimensions.

Five of our pines bear longer or heavier cones, with larger seeds than any found elsewhere, the cones of the very valuable sugar pine being 15–20 inches long, while those of the Coulter pine often weigh 8–10 pounds, the gray pine 3–4 pounds, the Torrey pine 2 pounds and the Jeffrey pine 1½–2 pounds, while the largest cones outside of California scarcely exceed 6 inches and the heaviest rarely weigh 1 pound.

Two of our spruces attain enormous dimensions—the very beautiful and valuable Douglas spruce of the Sierra and northward becomes 300–450 feet high, with a trunk 8–12 feet thick. The great Tideland spruce of the north coast is but little less in dimensions, while the cone of the Big-cone hemlock spruce of the San Bernardino mountains is 5–7 inches long and 3–4 inches thick when ripe and expanded—these dimensions far excelling any foreign spruce.

Five of our firs, the red bark, the white bark, and the Shasta firs of California, and the grand and noble firs of the region northward, become two or three times as large as any Eastern or foreign fir, being often 200–300 feet high, 12–18 feet in diameter, with cones 6–8 inches long.

Our two world-renowned redwoods—the coast redwood and the Sierra big trees, rising to the height of 300–320 feet and enlarging, while yet young, to a diameter of 20–35 feet, and growing for 3000–5000 years—are not approached in grand proportions and regal majesty elsewhere. And the cones of one of our redwoods—the Sierra big tree—though small as compared with our pine cones, are yet, doubtless, the monsters of their race, the largest being the size of a hen's egg, while the largest cone found in connection with the fossil remains of the twenty-five extinct species do not exceed the size of a nutmeg.

So with the 2–3-inch cones of our Alpine hemlock spruce, the 1-inch cone of the incense cedar, the 1½-inch cone of the Monterey cypress, the ⅜-inch berry of the California juniper, and the California false nutmeg—all the largest cones of their respective families.

Why This Favoritism?—This prodigality in number and size extends to other vegetable growths. Our oaks are numerous and often large, with the largest acorns and cups known. One of our maples bears leaves 6–10 inches across, while the little popgun elder of the East is supplanted here by a species 12–20 inches in diameter.

Most of the trees mentioned are indigenous to California and three-fourths of them are found only in that State. Why this great prodigality of nature in behalf of the Pacific slope, and especially of little California?

The solution of this problem involves a brief discussion of certain controlling factors.

At the outset we may observe that an impassable climatic barrier is set up at present by nature, preventing migration north and south. The torrid zone, in which no resinous trees can grow except on high peaks, separates the world's forests into unequal and very different floras.

The Southern Hemisphere is the home of the araucaria, the eucalyptus and the acacia, while in the Northern Hemisphere are found—in addition to the hosts of broad-leaved, non-resinous trees, such as oak, ash, hickory, etc.—all of the large families of pine, larch, cedar, spruce and fir, with the redwood, cypress and juniper; the distribution of these trees across the two continents, however, is very unequal.

Disparity of Areas and Distribution. — The northern part of the eastern continent—Eurasia—is, approximately, 9000 miles across. North America is but 3000. We would naturally expect, for instance, three times as many pines in Eurasia as in America. Of the eighty species of known pines, only twenty are indigenous to Eurasia, while sixty are flourishing in America.

Again, the Pacific slope region, from the Rocky mountains to the Pacific shore, is about 1000 miles—one-third of the distance across—yet it has forty out of the sixty American species, fifteen being in Mexico and twenty-five in the western United States, with twenty of these in California, a narrow strip of coast only 800 miles long by 150 wide, yet containing as many pines as all Eurasia!

Now, if the distribution was equal, Eurasia having sixty pines and North America twenty, the Pacific slope, being one-third of America, would be entitled to but 6⅔ species, and little California, which embraces about one-tenth of the Pacific slope, would have little more than half a chance to get one species!

This excessive prodigality of nature in favor of the Pacific slope, and especially the California part of it, is due to a combination of factors, chief of which are the contours of continents, the trend of principal mountain ranges, the behavior of certain oceanic and atmospheric currents, the alternate elevation and depression of continental areas, together with the ability of all these factors to modify the effects of certain crucial climatic periods, called—

The Ice Age and the Thermal Age.—The phenomenon of hot and cold periods in the earth's history compelling the migration, the change of location of the entire organic world—the kingdoms of the animals and plants—is a much discussed and controverted topic. Several theories have been presented from time to time, accounting for these important epochs, chief of which is the very interesting—

Astronomical Theory.—This theory, first presented by Mr. Croll, and endorsed by Prof. Geikie and many other English geologists, "attributes the Glacial age to the combined influence of precession of equinoxes and secular changes in the eccentricity of the earth's orbit," whereby the seasons, summer and winter, would have a disparity of nearly five weeks, instead of one week, as at present; this disparity, it is claimed, would produce Glacial and Thermal ages alternately every 21,000 years.

However, Prof. LeConte, America's most renowned geologist, controverts this theory in part, quoting from many authorities, showing that but one Glacial age can be proven. Referring to the researches of Prof. Wallace and others, he asserts that the phenomenon is the result of several agencies—astronomical, geological and geographical—producing a severe Glacial age of great length, with two cumulate periods of greatest severity and a sub-Thermal period between; the age commencing about 240,000 years ago, continuing 160,000 years and ending 80,000 years ago.

Great Destruction by Cold.—During this Glacial age the plants were driven slowly, generation after generation, a few feet at a time, down across the north temperate zone, by the world-wide sheet of ice, to be as slowly driven back by waves of tropic heat.

In this double migration, owing to the configuration of continents and mountain ranges, most of the plants were destroyed, only a few vestiges of the post-Glacial families being extant to-day, gathered here and there upon the plains or stranded upon the mountains.

The means and manner of this destruction are most interesting. The continents of both the old and new world are greatly expanded at the north, while the southern portions are attenuated to narrow peninsulas.

These configurations give to the north temperate zone its greatly dominant character, having most of the existing families, while the peninsulas are sparsely furnished.

The Eurasian mountain ranges are mostly transverse, like the Alps, Himalayas and Thian-Chan mountains, forming barriers to the progress of plants; while North American ranges are nearly longitudinal, permitting the plants to escape southward during a Glacial age and return during a Thermal one.

There is much evidence found as fossils in the rock strata that an abundant flora of monster trees once occupied the Arctic regions, similar on the two continents, owing to connections then existing or to nearness of extremities.

Manner of This Destruction.—The formation of an ice cap at the pole and of snow and ice deposits on the summits of mountains lower down in latitude, drove the plants down from the northern plains and down from the mountain sides to form vast hordes of fugitives hastening to southern plains.

This hegira continuing as the sheet of ice grew and plowed its glacier beds slowly down to median latitudes of Europe and Asia, the entire members of many families were overtaken on the northern side of the mountain ranges and frozen out; others, passing between the ends of the ranges, reached the shores of the Mediterranean sea and the Indian ocean, and were then and there destroyed, a few only escaping by the narrow, devious Isthmus of Suez into Africa, while others huddled upon the three peninsulas of Arabia, Hindustan and Malacca.

On the western continent a great portion of the plants in their flight came down unobstructed to the Gulf of Mexico, to be caught and frozen there; a few eastern families escaped on the peninsula of Florida, while the greater part of the western plants ran down along the plateau of Mexico into Central America and perhaps finally crossed on the Isthmus of Darien into South America.

(To be continued.)

Nevada's Exhibit at the Pan-American Exposition.

The State collections and specimens from museums have not been used in Nevada's exhibit, and no exhibit is shown that is not from a mine now in operation. A most advantageous opportunity is thus presented for investors and others interested in practical mining to familiarize themselves with the real mining resources of the Western State.

Nevada has 50 feet of space along the south wall of the mines building, the exhibit being attractively arranged in long mahogany cabinets 11 feet high. On the walls above the cabinets are pictures illustrating the underground timbering of the Comstock lode, and the Pamlico hill, showing the workings of the dump and other features connected with the mining work above ground.

On the right hand side of the exhibit is a complete quartz mill operated by electricity; a model of the underground timbering of the Comstock lode, and a model showing the underground workings of the Pamlico mine. Next is an exhibit of copper ores, showing every variety from native copper to the carbonates, from all over the State. Lead ores from solid galena to beautiful molybdate crystals are shown. Building stones, marble and onyx, including sky-blue marble, are presented. Silver ores, showing wire silver, ruby silver, horn silver, and black metal, bromide of silver, chloride of silver and stephenite are included.

A piece of discovery ore of the great Comstock lode, found on what is now known as the Ophir ground, is among the curiosities of the exhibit. Gold ores, from the wire gold of the Pamlico to the lower grade ores which predominate throughout the State, are to the left of the silver ores. Sulphur analyzing 99%, from the fields of Humboldt county, comes next. Iron ore of every sort, nickel and cobalt—the latter from Churchill county—are next in order.

Comstock ores from the surface to the 3250-foot level of the Con. California & Virginia mine are exhibited. Antimony and graphite are in the next group. Mica, rock salt, table salt, soda, borax, borate of lime, ulexit, silicon, natural mineral soap and salts of nickel are shown. There are a large number of other specimens.

Throughout the Exposition are kept complete bulletins of up-to-date mining news from Nevada, posted in the Nevada space, consisting of clippings from the most prominent Nevada newspapers.

Washington State will gain a strip of territory several miles wide and nearly 100 miles in length, containing some of the richest mines in the Northwest, according to the statement of the Dominion Government Boundary Commissioner, Robert McArthur. He will co-operate with the American surveyor, Sinclair, in making an accurate survey through the Mount Baker, Midway and Republic districts, as far east as the Rocky mountains. Last season much difficulty arose over the absence of the line, the landmarks of what was supposed to be the boundary being undoubtedly 2 or 3 miles too far south. Now McArthur makes the statement that the line originally surveyed was but a trial and was never put through properly. He says the definite line will give the Americans all the rich mines and other valuable property. The surveys of 1859 and 1861 were never completed. A very complete geodetic survey is now to be made, the work on which will last at least three seasons.

The exportations of petroleum oils for the fiscal year 1900–01 will probably be the largest in the history of this industry. In the quarter century from 1876 to 1900 the total value of mineral oils exported from the United States was about $1,200,000,000, an average of about $48,000,000 a year; and during recent years has averaged about $60,000,000 per annum, or $5,000,000 per month. One feature of the development of the industry is the decrease in the price to the consumer during this period, in which exportations and their net value have been increasing. The average value of the illuminating oil exported in 1876 was about 15 cents per gallon, and in 1877, an exceptional year, 20 cents per gallon. In 1881 the price was about 10 cents per gallon. In 1891 about 7 cents per gallon, and in 1898 the average export price was about 5 cents per gallon. In the nine months of the fiscal year the average export price has been 6⅔ cents a gallon.

The longest completed tunnel is at Schemnitz in Hungary; a drain tunnel from the mines to the Grau valley is 10 miles long. Its section is 10 feet by 5 feet 8 inches. It was commenced in 1796, but not completed till 1878. The total cost was about $5,000,000.

Coal Handling.

The Robins Conveying Belt Co. of New York have recently installed a coal-handling apparatus at the works of Jones & Laughlins, Ltd., Pittsburg, to carry coal from the river front to the coke ovens, which the accompanying illustration shows. The amount of coal conveyed daily varies from 2500 to 3000 tons, and as the elevator and conveyor can easily handle 500 tons per hour the daily consumption of the thousand coke ovens dependent on the system can be cared for in a single shift including the time lost in shifting boats and other similar delays. The enormous quantity of coal handled daily and the low cost at which the work is done place this system ahead of any known installation of a similar nature.

Coal Handling Apparatus.

The elevator consists of a double row of steel buckets each measuring approximately 4 feet long by 2 feet wide and 2 feet deep and these buckets, seventy in number, are attached to a steel chain. The elevator is supported at its head and foot on a boom which is moved in an inclined plane by an electric motor and in this way its position can be adjusted to any stage of water. Another motor drives the chain and a third warps the coal barges into position and moves them along under the elevator as fast as the coal is removed. Through these three motors one man operates the entire system controlling the working of the elevator and shifting the boats with perfect ease. This elevator was designed by Jones & Laughlins, Ltd., and built at their works.

At the head end of the elevator the coal is delivered to a Robins conveyor of the 30-inch size. As shown in the illustration, the conveyor first runs up a somewhat steep incline, the grade being 20°. After reaching a sufficient height the conveyor runs horizontally, crossing several railway tracks, including the main line of the Baltimore & Ohio railroad, over which it passes at a height of 24 feet. Near its inshore end it takes an upward curve and on reaching a height of 68 feet delivers its load to another similar conveyor running nearly at a right angle to the first. This conveyor is 250 feet between centers. The second conveyor delivers the coal into three hoppers, distributing it equally between them and automatically ceasing to deliver into a hopper as soon as it is filled. This is accomplished by means of "trippers" and an arrangement of chutes designed by the builders, the Robins Co. Both conveyors are driven at the end where they receive the load, and not at their head ends, as one would expect. By this arrangement the motor of the long conveyor is located in the house which also contains the elevator motors, and this concentration of the power plant is of undoubted convenience.

THE positive element in Edison's storage battery corresponding to the zinc in a primary cell is iron. The negative element corresponding to the carbon of the primary cell is a superoxide of nickel believed to have the formula NiO_2. The electrolyte is potash, in solution 10% to 40% by weight, but preferably 20% of potassium hydro-oxide. The mechanical structure and appearance of the plates is so similar that it is difficult to distinguish them with the eye. The difference is in the chemical contents of the pockets. In charging, oxygen is pulled away from the iron and delivers it temporarily to the nickel. Discharging lets the oxygen fall back to the iron. The electrolyte only acts as the carrier for the oxygen. The rates of charging and discharging are alike. The periods of time can be changed and made more or less rapid without loss of efficiency. Expressed in another way, the power applied in discharging the cell is the equivalent of the heat applied in reducing iron from the oxide in a blast furnace. In the former case the power is retained, or becomes latent, by what may be termed the further burning of the nickel oxide. In the blast furnace it is the carbon of coke which is burned, but the heat of burning becomes sensible instead of latent. In discharging the storage cell the burning of the iron to iron oxide again releases the heat of combination as power. The efficiency of the storage cells as compared with the lead cells used is about as 2½ is to 1—that is, for the same capacity of effective storage of electric storage the new Edison cell will weigh only two-fifths as much as the lead cells. It has further advantages in its ability to stand abuse. It can be carelessly handled and still do good work without deterioration.

Electrolytic Gold Saving in Western Australia.

The Riecken electrolytic process for the treatment of highly refractory sulpho-telluride ore, installed at the South Kalgurli mine, Kalgoorlie, West Australia, has now been in operation for nearly three months. It has taken the inventors nearly four years to complete the perfection of the process, and its success is now regarded as assured. The result is mainly obtained by the electrical precipitation of the gold. This precipitation is performed without the hitherto necessary step of separating the dissolved gold from the ore by leaching, settling or filter pressing. The process may be defined as a vat in which is charged the prepared ore made into a pulp with cyanide solution, and, after being allowed to remain therein for a specified time, has its precious metals withdrawn and saved, while the worthless pulp may at once be thrown away. Thus it is hardly more complicated than that simplest of all gold processes—the amalgamation of free gold. The essential portion of the Riecken plant consists of two vats, called "electro vats," each about 12 feet long, 11 feet deep and 8 feet 6 inches wide. In these two vats ore at the rate of 1200 tons per month is now being treated.

The vats are really open iron tanks with vertical ends, inclined sides and rounded bottoms, and are provided with proper beaters, with which the pulp is kept constantly agitated. The bottoms and inclined sides of the vats are lined with removable amalgamated copper plates. Bars of iron are suspended from the sides and bottoms, and distant therefrom and from each other about 18 inches. These form the positive pole of an electrical circuit, and the amalgamated copper lining constitutes the negative pole. The plates are maintained in a perfectly bright and active condition by a spray of mercury which issues from a perforated pipe at the top of the vat. The mercury runs down the plates in a thin, perpetually moving sheet to the bottom, passes out through a trap and is again elevated to the top of the vat by an air lift, and by this means a constant circulation is maintained. To put the matter in a nutshell, the treatment merely consists in charging the pulp, prepared in the mixing vat, into the electro-vats, adding a weak solution of cyanide, and then, by maintaining the flow of mercury and passing through the vat a current of electricity of about 15 volts potential, two-thirds ampere per square foot of cathode surface, the following effects are produced: The coarse particles of gold are rapidly and mechanically amalgamated by reason of the large surface of amalgamated plate presented in a state of maximum efficiency. The gold too fine to readily amalgamate, or that which is coated with a protective film, or enclosed in microscopic crystals of pyrites, is soon dissolved by the cyanide present, and, under the action of the electric current, the auro-cyanide of gold thus produced is broken up and the precious metal precipitated on the amalgamated plates. The agitation is continued for about eighteen hours, after which the pulp becomes valueless, its precious metals (not only gold, but also silver if present) existing as a mercurial amalgam on the sides of the vat. The now worthless sludge is at once discharged to the tailings dam, from which the water, after settling, is pumped back for further use. This operation is repeated until the amalgam has accumulated sufficiently thick to warrant its removal, when the plates are scraped, and the amalgam is retorted, melted and poured into ingots of practically pure gold ready for sale. Since the introduction of the process at the South Kalgurli mine it has treated upwards of 1500 tons of refractory sulpho-telluride ore, for a recovery of over 90% of its gold contents, and has reduced by upwards of 10s ($2.50) a ton the cost of treatment.—Australian Mining Standard.

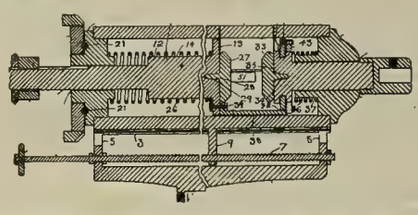
CONSTRUCTION of the Transsiberian Railway was begun at Vladivostok, on the Pacific coast, in 1891. In 1900 the constructed line was 3375 miles and the total length with Manchurian and other branches was 5542 miles. The total cost of the railway, with all its branches and auxiliary undertakings, amounts to $400,000,000. It runs near the 55th parallel through the southern portions of the three main divisions, viz., Western Siberia, in which gold, silver, copper, precious stones, iron and coal have been discovered; Central Siberia, the upper basin of the Yenisei, rich in gold, silver and copper, and the Amoor and coast territory, richer in gold than either of the others, in which, in addition, have been found tin and quicksilver. In the Central district is Lake Baikal, over 400 miles long, across which at a width of 40 miles the trains will be ferried by a specially constructed ice-breaking steamer. The entire journey from Tcheliabinsk, on the eastern base of the Ural mountains, to Vladivostok will take two and a half weeks.

Mining and Metallurgical Patents.

Patents Issued May 28, 1901.

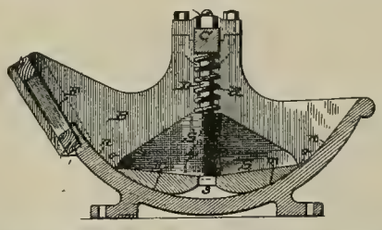
Specially Prepared for the MINING AND SCIENTIFIC PRESS.

ROCK DRILL.—No. 675,319; W. S. Boyd, 3rd, Los Angeles, Cal.



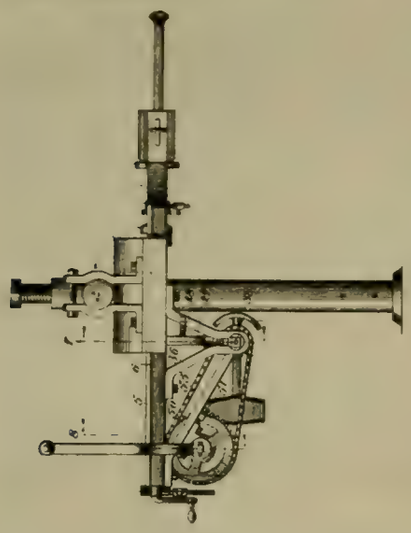
A cylinder formed with grooved legs and a pendent bracket, a bed plate formed with arms, rails supported on arms providing tracks for grooved legs of cylinder, a feed screw working in pendent bracket, turning in arms of bed plate, and having an operating hand wheel, a plug secured to front end of the cylinder, a plug secured to rear end of cylinder, a drill shaft, mounted in front plug, having a removable head, a spring for throwing drill shaft rearward, a striker shaft mounted in rear plug, having a removable head, a spring for throwing striker shaft forward, a collar mounted on striker shaft, having radial arms, a driven bevel gear wheel mounted on rear plug having cams to impinge against radial arms for retracting shaft, and a driving bevel gear wheel journaled to cylinder and meshing with driven bevel gear wheel.

ORE PULVERIZER.—No. 675,264; A. C. Calkins, Los Angeles, Cal.



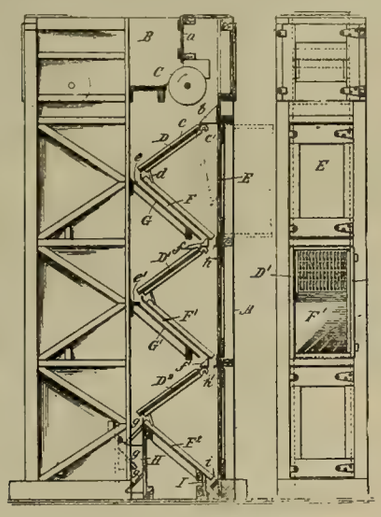
A concave bed and an oscillating shoe or muller having its upper surface lowest in the middle and having in its middle an opening through same to space between shoe and bed.

ROCK DRILLING MACHINE.—No. 674,881; M. Shuster, Great Falls, Mont.



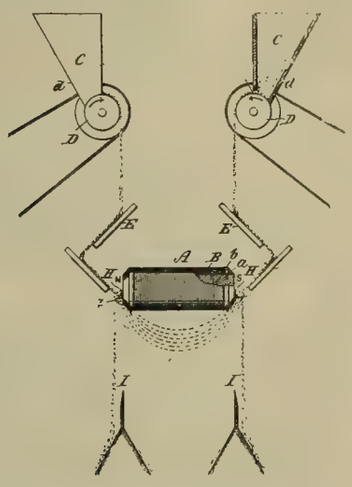
A frame or carriage and drive gearing, a drill head mounted to oscillate and to reciprocate in carriage, a rotating hammer, a striking pin to be engaged by hammer and having a ball-and-socket connection with drill head, means for normally holding striking pin out of path of movement of hammer, means for moving striking pin into path of movement of hammer, and catch device for holding striking pin in the last mentioned position until struck.

APPARATUS FOR SCREENING PULVERIZED MATERIAL.—No. 675,057; T. A. Edison, Llewellyn Park, N. J.



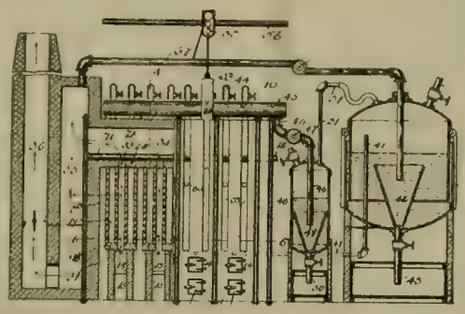
A series of short, stationary, inclined screen sections each formed of a thin plate slotted in direction of flow of material, means for causing material to flow by gravity successively over screen sections, means for feeding material to upper end of upper screen section in a thin, wide stream, and means for checking velocity of particles after they have passed over each screen section except last.

MAGNETIC SEPARATOR.—No. 675,056; T. A. Edison, Llewellyn Park, N. J.



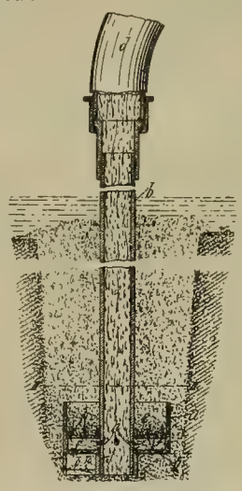
An oblong bar magnet wound over length of bar and arranged in horizontal position so as to present a laterally extended polar face, in combination with means to feed the mixed magnetic and non-magnetic material directly to the polar face of magnet, and means for automatically and separately receiving magnetic and non-magnetic particles continuously separated by the magnetic action.

FURNACE FOR THE REDUCTION OF ZINC ORES.—No. 674,936; H. B. Meech, Denver, Colo.



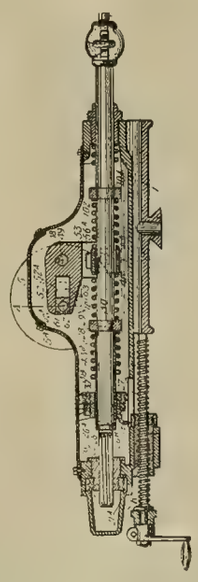
In series retorts arranged side by side, the walls of retorts formed of tongue-and-grooved firebrick, each retort having solid bottom and an opening at two opposite ends, a door closing each opening and means to open and close doors, a flue between retorts leading from a firebox to a point of exit, a firebox beneath each flue, fireboxes arranged to open alternately from opposite sides of furnace.

HYDRAULIC MACHINE FOR EXTRACTING GOLD FROM SAND IN PLACE.—No. 675,123; G. S. Bartholomew, Los Angeles, Cal.



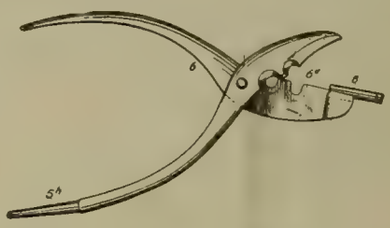
A cup; a table fastened to the cup and extending through bottom thereof, and opening beneath cup; means for forcing water through tube; and one or more pockets fastened on tube beneath cup, and provided with inlet openings extending inward from periphery of the cup.

ROCK DRILLING MACHINE.—No. 675,202; L. Durkee, Denver, Colo.



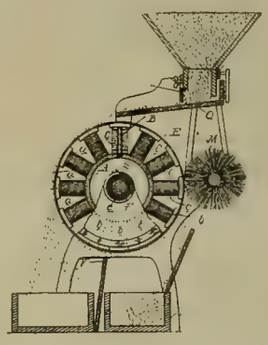
The cylinder of a drill holder reciprocally mounted in cylinder, and provided with two removable abutments, a drill-bit-holding chuck on outer end of drill holder, a sleeve loosely surrounding rear end of drill holder and arranged to bear against one of removable abutments of drill holder, a rifle bar threaded to rear end of drill holder and provided with a collar arranged to confine sleeve to drill holder and a spring-pawl-controlled fluted nut, revolubly mounted in rear end of cylinder and on rifle bar.

MINERS' COMBINATION TOOL.—No. 675,058; J. J. Elliott, Denver, Colo.



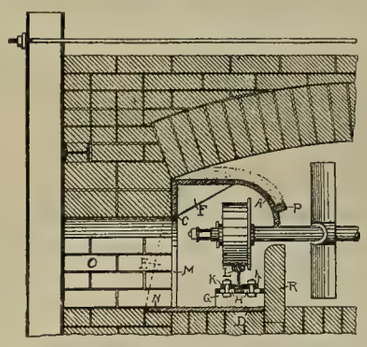
Two crossed members pivotally connected and provided with co-operating jaws located forward of pivot, one of jaws being reinforced at forward extremity and groved in plane of co-operating jaw to receive fuse extremity, opposite jaw being sharpened at its forward end to perform the fuse-splitting function.

MAGNETIC SEPARATOR. — No. 675,162; B. Noble, Detroit, Mich.



An iron cylinder, iron studs secured to and projecting radially from cylinder and arranged to form a circumferential and longitudinal series of pairs, coils upon studs connected in electric circuit to form magnets alternately of opposite polarity in both circumferential and longitudinal series, all magnets being magnetically coupled by cylinder, whereby a substantially complete magnetic circuit may be formed by the separated magnetic material bridging between any pair of opposite poles, and a non-magnetic sheathing surrounding studs and coils.

HEATING AND ROASTING FURNACE.—No. 675,281; A. W. Johnson, Tacoma, Wash.



The roasting hearth and an ore stirring device, a support for ore stirring device, support consisting of an upright portion having at its lower part an inwardly extending base and at its upper part an inwardly extending shield deflecting downwardly at its front, the upright, base and shield one continuous piece in cross section, and base having means for attachment of a rail for ore stirring device to rest upon.

PROCESS OF REDUCING METALS AND PRODUCING ALLOYS THEREOF.—No. 675,190; H. S. Blackmore, Mount Vernon, N. Y.

The process of reducing metals, which consists in exposing a molten bath of inert chemical salts free from hydrogen containing metallic oxide at a temperature below its normal melting point, to the action of metallic carbide, thereby liberating combined metal or metals.

THE Mount Cenis railway tunnel, 8 miles long, cost $370 a linear foot. The St. Gothard tunnel, 9¼ miles long, cost $235 a foot. The Arlberg tunnel, 6¾ miles long, cost $175 a foot.

MINING SUMMARY.

Specially compiled and reported for the MINING AND SCIENTIFIC PRESS.

ALASKA.

The opening of navigation this season has taken in a large number of people into Nome and the surrounding country. Reports from Port Clarence and other lately discovered districts that have come out by mail during the winter have been of a satisfactory character, and the Nome country should make a considerable gold output this year.

According to Dr. T. J. Vaugh Rys, the Aleutian islands contain gold placers. Two years ago Dr. Rys prospected Unamak island and found sulphur in abundance, but could not ship it, as that island has no harbor. At that time several seal hunters and fishermen found placer mining profitable and he was told by other prospectors that the Aleutians contained both placer ground and gold-bearing quartz. Most of the islands have good harbors, which are open the year round.

The report of the Alaska-Treadwell mine for May shows the quantity of ore crushed was 55,443 tons, yielding $63,650. There were 1122 tons of sulphurets saved, value $34,830. The total receipts were $106,930. The ore shows an average of $1.95 per ton. The gross expenses were $47,816.

From Forty-mile comes news of new discoveries on creeks not heretofore considered of value. Good pay has been found on Hunter creek and several forks of Jack Wade creek. The district anticipates the busiest season to date.

ARIZONA.

MOHAVE COUNTY.

It is said the Philadelphia & Arizona M. Co., operating near Kingman, will close down the Merrimac mill and close work in the stopes, keeping two shifts in the shaft, which will be sunk to 500 feet. Inability to save the ore values in the mill is said to be the cause. A new 100-ton mill will be erected at the mine immediately.

CALIFORNIA.

ALPINE COUNTY.

The Lewis or Boulder Hill mine, near Monitor, owned by H. F. Musser of Markleeville, has been bonded to Pittsburg people, who are developing the property. P. Curtz is Supt. The old Colorado mill at Monitor has been repaired to make a mill test on the ore, of which there are several hundred tons on the old dumps, some of it high grade but not yielding well to free-milling treatment.

AMADOR COUNTY.

Three Italians, arrested on suspicion of theft of gold, were searched and one small satchel yielded specimens of rich gold quartz estimated to contain about $1000. They admitted that the specimens were taken from the Keystone mine dump at Amador City.

BUTTE COUNTY.

The Banner mine, near Oroville, has been sold to W. P. Lynch and L. J. Hohl of Cherokee, who buy the property for the machinery and buildings. The mine is to be abandoned, as operating it is unprofitable.

The largest gold dredger on the Pacific coast has been started up in the Oroville dredging field. It is operating in south Thermalito, about 2½ miles west of Oroville, and is the property of the Boston & Oroville G. D. Co.; W. P. Hammon of Oroville, manager. It is the first of a series of five for the company. The hull is 86 feet long by 30 feet wide, with a depth of 7 feet. Without any machinery whatever it will weigh about 135 tons. The weight of the machinery is approximately 130 tons more. This machinery is of the Risdon standard pattern with buckets of 5 cubic feet capacity each. The dredger will work to a depth of 35 feet below the surface and stacks the tailings to a height of 30 feet above the surface. The machine is operated by electricity from the Butte County Electric Power Co. Eight men are employed, and the ground is expected to be handled for less than 4 cents per cubic yard.

CALAVERAS COUNTY.

Work is progressing at the Fanny Maria mine at Glencoe. All the old machinery is being removed and will be replaced by a heavier plant preparatory to unwatering the mine. A payment on the purchase price has been made.

A. Lundberg of the Fine Gold mine has men at work upon the mine under the management of W. Moyle.

W. E. Emery of the Duchess group of mines at Vallecito has a large number of men employed in the mine and grading for a stamp mill. Mr. Emery has also, under the management of G. H. Lewis, the Avalanche gravel mine, a hydraulic proposition. Over two miles of ditch have been made, 1300 feet of hydraulic pipe laid, and a large debris dam constructed. It is expected that hydraulicking will begin about the first of June.

The smelting works of the Union copper mine at Copperopolis were destroyed by fire on June 4th. This is the mine bought by Mr. Green, son of Mrs. Hetty Green, from the estate of the late Frederick Ames of Boston.

EL DORADO COUNTY.

A new slate quarry has been opened at Kelsey by the Bangor Slate Co., which has bought 280 acres of land of J. C. Murphy, 120 acres of Hanley and 40 acres of Hoffman—440 acres in all—at about $30 per acre, it is said. Six men are at work.

Work on the Plumb mine, near Folsom, has been begun by a company of Oakland capitalists. P. Gray of Shingle Springs and J. Wing of Mormon Island are superintending the work.

It is reported that a rich strike has been made on the 800-foot level of the Larkin mine.

The Mt. Pleasant mine, Grizzly Flat, laid off its miners last week until new boilers can be installed. Burleigh drills will also be added to the equipment.

KERN COUNTY.

The Yellow Aster Co. of Randsburg has re-elected J. Singleton president and R. L. Burcham secretary.

The King Solomon group, near Randsburg, owned by the Ashford M. Co., has been bonded to L. R. Garrett of Los Angeles for one year. Work is to be continuous; $1000 is to be paid in four months and $12,000 more in one year; P. McMahon is Supt.

MADERA COUNTY.

Chicago capitalists are said to be considering the reopening of Quartz Mountain, formerly worked by a French company.

On the old Star mine, on Mt. Raymond, H. Krohn is superintending the installation of new concentrators.

MARIPOSA COUNTY.

The Mariposa mine, on the Mariposa Grant, was worked intermittently for many years, the lowest workings then being 275 feet. The Mariposa Co. has been about eighteen months at work, has sunk 800 feet in a new shaft and has run 3000 feet of levels. On the 800-foot level the ledge was found 5 feet wide and rich. From six to eight drills are used and fifty men are employed. Sixty tons of ore are crushed daily. Sinking is to be carried down to the 1000-foot level.

NEVADA COUNTY.

The mine owned by P. Dunn near Nevada City has been bonded to San Francisco people and operations will be commenced soon. The mine is close to the Mountaineer.

The bonding of the Golden West mine, Grass Valley, owned by C. Temby, C. Tregonning and J. Seymour, is reported. There is a ledge 5 feet thick on the mine, showing free gold.

The indications at the Frank mine, in the Blue Tent district, are encouraging. Some promising gravel was recently struck, and the company has decided to sink to bedrock at once. The new hoisting works have been completed.

PLACER COUNTY.

The Pioneer-Lynn G. M. Co. have closed down the mine, near Damascus, again and are examining it to determine the advisability of continuing work. Low-grade ore bodies have been found, but will not pay to work with a 20-stamp mill.

SHASTA COUNTY.

Surveyors are engaged surveying an electric railroad from the Bully Hill mines at De Lamar to the Southern Pacific, above Kennett. The line will pass through Copper City and down Pitt river. It will be about 20 miles long and will get power from a plant on the McCloud river. It will be built immediately on the completion of the survey.

The Berg & Montgomery claim in the Centerville district is sending rich rock to the Keswick smelter. Out of a rich bunch $800 was hand mortared. H. Berg and J. Montgomery are the owners. E. Shallock is working the mine on a lay.

The strike made by Boswell & Johnson on Main street, Shasta, has developed into a well-defined ledge, showing free gold and averaging about 2 feet. They are down over 30 feet.

W. Richardson of French Gulch, owner of the Expert mine near that place, made a rich strike, in making an upraise of 100 feet from the tunnel, of a streak 1 foot in width which assays $60 per ton and is free milling.

Thirty claims surrounding and adjoining the Balaklala group in Flat Creek district have been bought by the Balaklala M. Co. for $3750, which company now owns nearly sixty claims in a group on the sulphide belt.

SISKIYOU COUNTY.

A company is arranging to put a dredger in McAdams creek, near Ft. Jones, to work the deep bedrock gravel, so difficult to mine by other means on account of the water in the ground.

Judge O'Neill, who owned about a one-twelfth interest in the Ball mine, near Sawyer's Bar, sold his interest for $10,000 spot cash. The same amount was offered to G. D. Butler, who refused to sell. This mine has been paying good dividends.

J. Daggett, manager of the Black Bear G. M. Co. at Black Bear, reports that a vein of quartz 8 inches in width has been struck in sinking the new shaft north of the old works.

The Lamb quartz mill at Yreka creek has made on quartz from Shurtleff's ledge in Fool's Paradise district, Shasta river, an average of about $17 or $18 a ton.

A mining man of San Francisco has been communicating with Yreka people in reference to establishing a portable smelter at Forks of Humbug, which it is claimed will treat ores of Humbug district that do not realize well in the stamp mills. The Humbug quartz contains arsenic, sulphur and other rebellious substances that make milling unsatisfactory.

The Greenhorn blue gravel mine is to be reopened.

TRINITY COUNTY.

The Last Chance M. Co. of Philadelphia, Pa., has made the first payment on the Given ranch at Junction City. The company expects to install a dredger there before the rainy season begins.

The Sweepstake H. G. M. Co., near Weaverville, have obtained water rights on Grizzly creek and plan to bring water to the mine on a line 20 miles ditch and 20 miles of 30-inch pipe. The contract for the pipe has been let. The work is estimated to cost $750,000. It is stated that a sale of the mine has been made at a very large figure.

TUOLUMNE COUNTY.

E. H. Williams, Supt. of the Golden Treasure mine, near Big Oak Flat, says that 40 feet down the ledge is 2 feet wide, at a point where rich specimen rock was taken out.

YUBA COUNTY.

J. E. Doolittle, associated with John Hays Hammond in dredger mining in Butte and Yuba counties, has a bond on 2000 acres of the Newbert farm, owned by J. O'Brien, below Smartsville, and says development work will be resumed there soon.

COLORADO.

BOULDER COUNTY.

The Wood Mountain M. Co. has paid the Woods-Phillips estate for the mine at Boulder and has $35,000 in the treasury, in anticipation of the immediate erection of a new mill, which will have a capacity of about 150 tons a day, amalgamating and concentrating.

CHAFFEE COUNTY.

The Stockton group of copper claims near Cleora have been bought by a company of South Dakota men. A shaft is being sunk on the vein and a tunnel is being driven which will cut all the veins 200 feet deep.

CLEAR CREEK COUNTY.

D. P. McDonald of Denver and Idaho Springs people have bought a mill site at Idaho Springs, a water right, have plans nearly completed and are at work on the construction of a custom mill for milling concentrating ores. The plant and machinery is to be of the latest and best types. The power will be electricity. The mill will be built for 100 tons capacity, but is so arranged that it can be enlarged. Contracts with large shippers in Clear Creek and Gilpin counties have already been made, insuring business from the start. O. W. Lowell is secretary and treasurer of the new enterprise, D. P. McDonald of Denver is president and A. H. Roller manager.

The May output of the mines of the Idaho Springs district shows a tonnage of 1800 tons at $50, or $90,000; 19,300 tons at $12 per ton, or $231,600; making a total tonnage of 21,100 tons, of a value of $321,600.

GILPIN COUNTY.

The Bertha M. & M. Co., which recently bought the Anderson mill at Idaho Springs for the Newhouse tunnel ores, is now planning for a 10-stamp mill on its own mill site at the mines. The proposed mill is for testing different grades of ore before shipping.

Michigan parties are organizing a company to operate the Wheel of Fortune group near Black Hawk. They intend putting up a new shaft building and machinery. T. O'Hea will be Supt.

Chicago parties have bonded the Eldorado claim in Russell district, near Central City, owned by H. Williams. The shaft is about 200 feet deep and is being retimbered under the management of W. Shull. A whim is being put up for temporary purposes, but a power hoisting plant will be put in when the work of repairing the shaft is completed. A company will be organized by the lessees.

The Stephens Investment Co. have sold to the Robert Emmet G. M. Co. the Queen of the West and Golden Gate lode claims, situated in Chase gulch, for $25,000. W. H. Nicholls is manager.

The total number of cars of ore, smelting and crude, and mill concentrates shipped from Black Hawk for treatment during the month of May was 319—a total tonnage of 5742. This is the largest monthly shipment made this year.

It is reported that H. Bolsinger has a company to take the Hubert property at Nevadaville and that work will soon be started.

GUNNISON COUNTY.

G. W. Griffey and J. Gordon, owners of the Rustler mine, in the Gothic district, will soon begin work on the property. In early days, transportation and smelter charges were so heavy that the owners did little work. It has lain idle the greater part of the time since 1873. The present owners bought it from the Buck estate. Last year they opened the vein in various places. The vein is about 3 feet wide and carries 6 to 18 inches of high-grade material. The mine is located at an altitude of 13,600 feet.

HINSDALE COUNTY.

A strike has been made by the Red River Co. at Lake City. At 1154 feet from the mouth of the Lellie crosscut and 900 feet down the vein was cut into and found 17 feet wide, with pay streak of 3 feet. The owners are Boston people, who will build a concentrating mill.

LAKE COUNTY.

Leadville mines from May shipping account show an estimate production of 80,000 tons of ores, estimate value $1,300,000 of gold, silver, lead and copper. The amount of development at present under way will add more production to the present rate as the season advances.

At the Ruby mine on Iron Hill the lessees, Horrigan, Dale and associates, expect some important developments soon. Some time ago at the 700-foot point the shaft entered 15 feet of high-grade sulphides carrying values in gold, silver, copper, lead and bismuth. Arrangements have been made to install a pumping plant and open drifts in the ore body. The mine will now be unwatered.

A. J. Davis of the firm of E. O. Jacobsen & Co., of New York City, who have been the principal purchasers of zinciferous ores at Leadville for export to spelter works in Belgium, recently inquired of Leadville's zinc mine owners and operators as to their ability to furnish him a steady heavy output for five years in advance for a new $300,000 mill which he contemplates building in the Arkansas valley, to concentrate Leadville's zinc-lead sulphides. Antwerp, Belgium, capitalists who have concentrating works saving 95% of the metal content of gold, silver, copper, iron and zinc are willing to finance this modern and extensive separation works provided they can be assured of a five years' supply. The composition of the ore is familiar to them from smelting thousands of tons of it. Mr. Davis is quite satisfied as to the feasibility of the undertaking and exhibited plans and drawings of the great Belgium works.

SAN MIGUEL COUNTY.

The San Juan G. M. Co., at Telluride, have made the final payment for the Bessie group—$18,000—closing the deal made three years ago, when the company bought of Watton & Dowd the Montezuma, Gen. Hancock, Little Sioux, Bessie, Leadville, Little Girl, Black Eagle, Olga and Baldy claims. It is probable the management will be consolidated with that of the Alta, as the purchasers of the Alta are the principal stockholders in the Bessie Co.; A. C. Koch will be local manager.

Two weeks' run at the Butterfly-Terrible mill produced 360 ounces, valued at $5400, and a car of concentrates worth $1000.

SUMMIT COUNTY.

Chicago people have made a contract to buy the Nil Desperandum property in Galena gulch, near Breckenridge, for $30,000. The property consists of the 15-stamp mill and the Gold Bug and Nil Desperandum gold mining claims. J. Olsen is to be Supt. for the new owners.

TELLER COUNTY.

The Portland mine, at Victor, is reported sold to Londoners, either Werner, Beit & Co. or the Venture Co. The price paid is said to have been $15,000,000, though it may be less. The mine has paid $41 a share in dividends and is said to have ore bodies exposed equal to its production to date. The Portland and Stratton's Independence adjoin. The two properties have produced $12,000,000 and paid $8,000,000 in dividends. The two can be worked economically together.

R. Prosser has leased for fifteen months,

from the Woods Investment Co., the Anna May Wells at Cripple Creek and has put men at work prospecting.

It is officially said that the Last Dollar G. M. Co. will pass the quarterly dividend on account of expense of permanent machinery and development work. The statement to the stockholders shows $42,500 in cash on hand, and that there has been ore production returns amounting to $694,773.12 from April, 1896, to January, 1901, with a profit of $162,128.47, out of which has been paid $120,000 in dividends.

The contractors on the new 600-foot level of the Blue Bird at Cripple Creek are taking out ore running from $20 to $30 a ton. The shaft has been sunk about 400 feet in three months and is at the 900-foot station.

The Dameral G. M. Co. at Cripple Creek, composed of Boston capitalists, is prospecting its ground under the management of D. Heaton. Several veins assaying from $5 to $23 a ton have been discovered.

The production of Cripple Creek for May is estimated at $1,720,000, a falling off as compared with former months, owing to the shutting down of the Portland. This decreases the tonnage by about 6000 tons of smelting grade ore. The decrease is also added to by the Elkton property dropping from 2000 tons to about 800 tons. The Eclipse and Golden Cycle have largely increased production. The Colorado-Philadelphia R. W. handled 18,000 tons; average value per ton, $30; gross value, $540,000; Union, 6000; $30; $180,000; Economic, 1000; $30; $30,000; Metallic, 7000; $30; $210,000; El Paso, 3500; $30; $165,000; smelters, 9000; $70; $630,000; miscellaneous, $25,000; total, 44,500 tons; gross value, $1,720,000.

IDAHO.

ADA COUNTY.

D. Southworth will shortly begin construction of a small quartz mill on property owned by his company on Blacks creek, about 13 miles from Boise in the Neal district.

The Idaho & Seven Devils M. Co., Ltd., has incorporated to operate mining property. The place of business will be Boise City, and the directors are: W. S. Neal, N. W. Bower, C. H. Roberts, J. R. Good, all of Boise, and F. Alers of Helena, Mont.

BLAINE COUNTY.

At Bullion, the Jay Gould is operating under lease with a small force and making some shipments of galena and gray copper.

The Democrat, owned by the Della Mountain M. Co., comprises five patented claims, 6 miles northwest of Hailey, ships forty to fifty tons a month of ore running 70% lead and 123 ounces silver.

The Bullion, leased to W. H. Watt of Hailey, operates with a small force and ships ore that runs 68% lead and 145 ounces silver.

The Idahoan, at Bullion, also under lease, is making small shipments. Its ores run about 67% lead and 65 ounces silver. The Red Elephant, in same locality, will soon start up.

The North Star, located up East Fork, which belongs to the Philadelphia & Idaho Co., is working and shipping under lease to J. Anderson and Bud Pumphrey. Twelve miles west of Ketchum is the Sunday group, operated by Thos. O. Hampton as lessee.

The Tyrannis, owned by H. M. Richard and J. S. Thorndike, of Paris, is working with a small force of men. A mill is being erected.

The Minnie Moore, at Bellevue, in charge of Mr. Tustin, is being retimbered in places, the levels cleaned out and put in condition to resume work.

Hailey, Idaho, June 1.

The Seattle Co., developing the Richardson and Junction groups of claims on the Gold Belt, near Hailey, will take up the bonds and begin permanent development, the work done under the management of J. Richardson being merely to prospect the ground.

The crosscut from the 500-foot level of the Golden Star, at Hailey, has cut into the vein, finding it regular and well defined as on the upper levels, with the usual dip of 45°. The course of the vein being ascertained to this depth, a vertical shaft will be sunk, as the vein is too far from the incline.

IDAHO COUNTY.

F. J. French, general manager of the Blue Jacket Con. C. Co., in the Seven Devils district, says his company is putting down a three-compartment shaft to a depth of 500 feet.

SHOSHONE COUNTY.

The strike on the Humming Bird is said to be better than at first reported. The blind lead where cut carries 3½ feet of carbonate ore, upwards of 2 feet of which is expected to be of shipping grade. Much of the ore is full of crystallized lead.

The Golden Chest M. Co. is negotiating to buy several miles of placer ground on Butte creek, and water rights, with the intention of running the stamp mill by water power. E. Behr has been appointed as manager.

The Hornsilver M. & M. Co. has incorporated; capital, $100,000; with principal office at Wallace. The directors are: T. B. Johnson, A. Steers, J. Taylor, J. F. Metz, M. L. McNeil, N. Wittner and P. Erickson of Wallace.

WASHINGTON COUNTY.

The Heath M. Co. has bought the Brown-Stemwinder groups in the Heath district. F. Fairbairn of Philadelphia closed the deal for the company. R. T. Woliston has been engaged as superintendent and development work will be done this season.

MICHIGAN.

HOUGHTON COUNTY.

The Calumet & Hecla will install electric power to work the six stamp heads in new mill at Lake Linden. The old hoisting engine at the mine will be remodeled, furnishing 1000 kilowats for operating stamps and the new sand wheel, which is 62 feet in diameter, 12 feet larger than the two wheels now in use.

MONTANA.

FLATHEAD COUNTY.

It is reported that a cyanide plant will be built in West Fisher district by Denver men, so J. E. Clark, who has been examining several of the properties in that district for them says. The Lake claim has been bonded by Mr. Clark and he will begin work at once. He says the ledge is about 3 feet wide and that the values range up to $50 a ton.

A stamp mill is to be built on the Mother Lode in the West Fisher district. W. J. Beager, the manager, says it will be completed by October.

The Brick & Brannagan mill is crushing twenty tons a day. Work is being prosecuted in both tunnels, the upper one being in 360 feet and the lower one 90 feet. The saw mill has been started to cut lumber for a flume, which will furnish water power to operate the mill.

Greenwell & Vaugh have sold their placer claims on Libby creek for $25,000 to E. Haskell, a Wisconsin capitalist, who will install placer mining machinery. Several years ago the owners ran a tunnel from the creek level to strike a lead which they had found on the mountain side above. Several hundred feet of this tunnel was run in pay gravel. The owners have been constantly developing their ground since then.

GRANITE COUNTY.

J. H. Ortman, manager of the Crescent G. M. Co., operating near Phillipsburg, is driving a 1500-foot tunnel to cut the lead 800 feet down, when the company will build a mill.

LEWIS AND CLARKE COUNTY.

About twenty men are employed on the Gray Eagle, near Comet, by J. Lind of Minnesota and his associates, who have bonded it for eighteen months at $100,000 and 25% royalty from J. J. Holmes and the Dahlman Bros.

The Cataract C. M. Co. has incorporated in South Dakota and bought claims on Cataract creek, near Basin, and has begun work on them. G. M. Hays of St. Helena is president, J. H. Calderhead secretary and M. L. Hewitt of Helena is general manager.

Forty acres in Kenwood, formerly the Barden tract, has been bonded by Platt & Heath to L. S. Woodbury of Great Falls at $5000, and one of the conditions is that work shall be commenced at once. Surface prospecting has shown a well defined vein which carries gold, silver and copper.

MISSOULA COUNTY.

The St. Regis C. M. & M. Co. has incorporated, capital $300,000, to mine near St. Regis. W. H. Houston and T. S. Letterman of Missoula and F. W. Wilson and L. McHeffey of St. Regis are the incorporators.

PARK COUNTY.

The Yellowstone mine, Castle district, near Livingston, is making preparations to resume operations.——The owners of the Great Eastern recently struck a rich pocket, from which they have taken $40,000.

SILVER BOW COUNTY.

The United Copper Co. of Montana has incorporated under South Dakota laws, with $80,000,000 authorized capital. It is stated that the company is entirely independent of the Amalgamated Copper Co. The Montana O. P. Co., which is said to be producing copper at the rate of 40,000,000 pounds a year, will be included.

NEVADA.

The new copper works at the Bluestone mine, in Mason valley, have been started up and will treat from 150 to 200 tons of ore per day. The company expect to ship about one carload of copper matte daily. The lead varies in width from 10 to over 100 feet. Some of the ore is very rich, crystallized sulphate of copper or bluestone being one of the minerals.

J. J. O'Connor has sold to W. J. Sisson the White Elephant mine and a one-third interest in the Butcher Boy claim near Denio. This mine is a free-gold proposition. Men have been put to work.

LINCOLN COUNTY.

The mine below Bunkerville, at Copper King, is said to be developing excellently. The copper ore is not of a high grade, but of a fair paying average. The ore that goes low in copper goes high in nickel.

In Searchlight district the Quartette Co. is working a large number of men. Three miners extracting ore keep the 40-ton mill running. The company is doing considerable development work.

The Perew mines are working about twelve men. The ledge is said to be narrow but rich.

Colton & Rose are preparing to start up work on the Searchlight group.

The Horseshoe mine and mill at Fay are handling about 2850 tons of ore per month, the product being aurocyanides of the value of about $18,000. J. MacFarland is superintendent, but is now in South America; Louis Seckels is secretary of the company, with offices in Salt Lake City.

LYON COUNTY.

F. A. Bierke of Virginia City has sold to San Francisco people the Oest mine, near Silver City; the price is said to be about $100,000.

WASHOE COUNTY.

G. W. Pettigrew & Co. have bonded ten mining claims in the Steamboat district to San Francisco parties, who are now sinking a shaft.

The Reno Star, or the Wedekind mine, situated 4 miles northeast of Reno, has been bought by J. Sparks for $175,000. The new owner will begin the development of the mine on a large scale at once, installing machinery and putting several hundred men to work. V. Wedekind, the discoverer, who made the sale, is an old man—a piano tuner—who at odd times kept digging into the hill for pay dirt, to the amusement of the neighborhood. About a year ago he struck rich ore, and now makes this sale before he put any machinery on the mine.

NEW MEXICO.

The Torpedo M. Co., at Organ, is putting in a new 60 H. P. boiler, adding to the present plant. A new stationary pump, capacity 800 gallons per minute, will be installed. A strike has been made in the lowest level of mineral running high in copper and more silver than any ore before found.

GRANT COUNTY.

R. C. Ross and A. W. Tennant have bought the Clear Lake M. Co.'s property at Steeple Rock for $150,000. They propose to put in more machinery. Mr. Ross will be manager for the new company.

SOCORRO COUNTY.

J. R. DeMier of Las Cruces, lessee of guano and phosphate fields on the Armendaris land grant, near Lava station, on the A., T. & S. F. R. R., says he is shipping about six tons of guano and phosphate daily to California, where he has contracts with orange orchard owners.

OREGON.

GRANT COUNTY.

It is said that a payment of $4000 has been made on the Climax mine at Granite, owned by J. F. Hardee. The full price is $16,000, the payments in installments. The Climax was located on July 4, 1899, was developed by Mr. Hardee by a tunnel 200 feet in on the vein and by several cuts and shafts.

JACKSON COUNTY.

Considerable prospecting is being done near Ashland for quicksilver. A number of prospects too poor in mineral to pay have been found and one prospect on Little Applegate creek on which a Montana company is drifting on a ledge that will pay.

JOSEPHINE COUNTY.

It is reported that C. R. Ray of Gold Hill has bought the Roaring Gimlet mine, near that place, for $10,000 cash, after the owners had taken out about that sum from ten days' work in a pocket.

UTAH.

BEAVER COUNTY.

The Old Ben M. Co. has incorporated; capital, $30,000; to operate the Old Ben and other mining claims in this county. W. S. Foster is president.

BOX ELDER COUNTY.

The Century mine is producing about ten tons of gold ore per day, which are being milled by stamps and amalgamation, by which a saving of $15 per ton is made. The tailings are concentrated, whereby a saving is made, the table tailings being cyanided. The mill is being enlarged to forty tons daily capacity. The mine is opened through a 240-foot tunnel, with considerable of drifting. A second tunnel is being driven to cut 150 feet under the upper workings. Dr. White, of Salt Lake City, is principally interested in the property.

Park Valley, May 27.

IRON COUNTY.

The mill to be erected at the Ophir mine, this place, by Dederichs & Burke of Salt Lake City, is to have a capacity of 100 tons per day, and will be provided with crushers, rolls, driers, two roasters, cooling floor, eight leaching tanks, six silver precipitating tanks and three tanks for the precipitation of lead, to carry out the methods of the Russell extraction process. The ore is partially chloridized, with some sulphur in combination of iron and lead. M. L. Effinger is secretary of the company.

Stateline, May 27.

JUAB COUNTY.

The ore belts of the Tintic range are susceptible of a more or less definite division. The contact between the porphyry of Treasure hill and the lime belt of the Tintic hills passes through the locality of the Dragon iron mine, this dividing line veering to the north as it passes westward, leaving the Swansea group, near Silver City, in the porphyry. But, beginning with the Star, in the lime belt, and taking in the Boss Tweed, Red Rose, Carisa and Spy, and you encompass the known mines of copper, gold and silver on the east zone. Continuing northward, including the Utah, Sioux, Humbug, Yankee, May Day, Uncle Sam and Godiva, and we take in the silver-lead ores. This shows a division of the mines located along the east side of the range. The west zone may be similarly divided: Beginning with the Ajax and including that and the Lower Mammoth, Mammoth, Grand Central and Centennial-Eureka and we find gold, silver and copper values in a quartz-siliceous gangue. Continuing on northward we find in the Eureka Hill, Bullion-Beck and Keystone lead, silver and gold values in a sulphide and carbonate lead ore. Thus, it will be seen, that in the north end of the range are the lead ores, accompanied by gold and silver; while in the mines of the south end the copper is the base that preponderates and carries gold and silver.

On the east zone the ore shoots run longitudinally within a great north-south fissure, the material of the latter being largely an altered lime. In the Carisa the ores in the main shoots comprise gray copper, with gold and silver, in a quartz-spar gangue. Under and adjacent to the main ore shoots are secondary deposits of copper oxides, not accompanied by gold and silver, which are believed to be the result of re-precipitation from the main ore shoots. These secondary deposits are in irregular pockets. The ores thus far shipped from the Spy, running from 17% to 20% copper and 10% excess of iron, are claimed to have been largely from the secondary deposits, resulting from re-precipitation. It is believed, however, that the primary ore lenses may be reached on the Spy at greater depth. The Carisa and Spy adjoin and are included in the same ownership, A. J. Underwood being the manager. On the Spy a perpendicular shaft sinks 700 feet, from the bottom of which a level is being run southwestward to cut under the Carisa at 830 feet depth. The Carisa shaft, now down 250 feet in ore, will be continued 600 feet deeper to connect with the level from the Spy.

The Carisa ores carry 65% silica, 5% to 20% copper, 10 to 20 ounces silver, ½ ounce gold. The Spy ore carries 17% to 20% copper, 10% excess of iron and no gold or silver. This group is shipping about 800 tons per month. The Oregon Short Line has extended a spur from Silver City via the Tesora to a point near the Carisa-Spy group. WASCOTT.

Robinson, May 23.

SALT LAKE COUNTY.

The New England G. & C. M. Co. has incorporated; capital, $1,000,000. The head office of the company is at Denver and the mining properties at Bingham. D. W. Williams is president and E. Hewitt secretary. E. M. Gibson and W. E. Guthrie of Omaha and S. W. West of Salt Lake City are directors.

SOUTH DAKOTA.

PENNINGTON COUNTY.

The Boston-South Dakota M. Co. is preparing to begin work on the new cyanide plant projected for the Gustin-Minerva mine and mill near Deadwood.

The little cyanide plant owned by Cook & Gibbs has been leased to C. K. Weedon, T. Fallon, D. Nelson and J. Terry of Deadwood, who will operate it on ore from their own mine. The mill has a capacity of about thirty tons per day.

The Alta M. Co., just commencing to

operate in the Black Hills, is getting out plans for a 50-ton cyanide plant to be erected at the Little Blue mine in the Yellow Creek district, near Deadwood.

The Maloney-Blue Lead Copper Co. is surveying a site at Sheridan for a fifty-ton smelter. The Blue Lead copper mine has been opened for nearly twenty-five years. The company has stripped the ledge outcrop and shafts have been sunk at intervals, showing to a depth of 50 to 75 feet. At those depths an ash bed occurs, which is barren of copper value. A tunnel is being run near the water level, in the expectation of striking the main ledge of copper ore beneath the ash deposit.

WASHINGTON.

FERRY COUNTY.

Great activity is reported in Meteor and Cedar Canyon districts. People from Keller have laid out a townsite and begun preparations for building. The whole country for miles around the Meteor Swan is staked. On the Nonpareil, the Stray Dog and the White Swan properties double shifts are working. The White Swan people expect to strike the lead in July. Assays from select surface samples run very high.

CHELAN COUNTY.

C. W. Dick has run a tunnel 80 feet on the Lucky Dick claim, near Wenatchee, cutting the ledge 188 feet below the croppings. He says it is 15 feet wide, with well-defined foot and hanging walls. He has made a test shipment to the smelter.

WYOMING.

CARBON COUNTY.

The Kurtz-Chatterton Co. has decided to sink a 1000-foot shaft on their mine at Grand Encampment, which, when completed, will allow a production of 1000 tons of ore per day. Recent workings have struck a body of ore 18 feet wide.

The new custom smelting works at Grand Encampment will be completed by July 1. Its capacity will be 100 tons per day.

The Adams Copper Co. has been incorporated to operate in the Grand Encampment district; capital, $150,000; incorporators—G. F. Adams, A. E. Humphreys, S. G. Bonney, S. W. Eckman.

FOREIGN.

BRITISH COLUMBIA.

The Slocan mining division has exported 1734 tons of ore up to date this year.

The Ivanhoe mine, near Sandon, has closed down.

Work has been resumed on the Maybe, near Ferguson, where they are driving a 200-foot tunnel.

At the Alice mine, near Creston, the vein has been cut at the 250-foot level, 3 feet wide, and carries the same grade of ore as on the 100-foot level. The ore is silver-lead, carrying twenty to thirty ounces silver to the ton. T. G. Proctor of Nelson is manager.

The Miner-Graves Syndicate will resume work on the Rockland mine, near Silverton, at an early date.

At the Richelieu Con. mine, near Crawford bay, a tramway 8000 feet long is to be constructed, connecting the mine with the end of the wagon road.

Work is to be commenced soon on the Second Relief mine, near Erie. A saw mill and stamp mill will be constructed and other improvements made.

The Tit for Tat group, East Kootenay, has been bonded at $50,000. It is a free-milling gold property.

A strike has been made in the Silver Cup mine, at Ferguson.

The Minnesota M. & D. Co. has bought the Nellie group on Lexington creek, in the Lardeau mining division.

The Lone Star group, near Ferguson, has been bought by Toledo, O., people, who propose to open a 250-foot tunnel at once.

The V. & M. mine, at Twelve-mile, Slocan district, will put in machine drills.

The Bear Creek M. Co. of Seattle, Wash., has placer claims on Bear and Clear creeks, in Cassiar district, about 75 miles from Skaguay. A Government road is being built to the new diggings and will be completed before June 1.

At the Con. Cariboo hydraulic mine, at Bullion, a large bank blast was successfully exploded. This blast contained 4540 kegs (equal to 113,500 pounds) of powder, distributed in 1200 feet of powder drifts across the face of the bank, and broke up about 2,000,000 yards of gravel. This is probably the biggest bank blast that was ever exploded in a deep gravel mine on the Pacific coast or anywhere else. Piping commenced April 20. J. B. Hobson is manager.

The Anderson Lake mines, operated by the Anderson Lake M. & M. Co., in the Lillooet mining division, is being operated under W. E. Brett of Lillooet. A 5-stamp mill on the property produced about $2000 in bullion in April. A. F. R.

Nelson, May 30.

The Hayes copper mine, at Alberni, Vancouver Island, has been bought by Mackenzie & Mann of Montreal. Payment of $50,000 on a total of $600,000 will be made July 15, and payments of $100,000 each every three months. A tramway from the mine to salt water will be built. The erection of a smelter is included in the plans of the new buyers.

On the west side of Wild Horse creek, near Fort Steele, is the Bald Mountain claim, now bonded by A. J. Alcock of Vancouver at $25,000. The mine is owned by D. Griffith and the ore is free-milling gold quartz. H. Kershaw of Fort Steele is agent for the new owner.

It is reported that the Payne mine, near Sandon, has been closed down, and there is uncertainty as to when it will be reopened. The contract for the concentrator has been let.

J. L. Retallack and S. Norman have been examining the Washington mine, at Sandon, with a view to placing the control in the hands of the Northwestern D. Co., represented by the former.

The V. & M. Co., operating on Twelvemile creek, has decided to put in machine drills, and negotiations for the machinery are under way. When the machinery is installed a large increase of men will be made. Manager Little states that his company will proceed with the survey of the V. & M. group, to get the property Crown-granted. The full returns from the smelter on the carload of ore recently sent to Trail netted the company $43.60 per ton.

A consolidation of the War Eagle, Red Rock and Lulu claims in Phœnix is reported to have been made and the controlling interest sold to a London, Eng., company, to be known as the Sherbrooke Con., capital $750,000, in $5 shares. Operations will shortly be commenced. The War Eagle has a large outcrop of gold-copper ore. The mine is equipped with a steam plant. The development consists of a shaft sunk to a depth of 100 feet, with 600 feet of drifting and crosscutting.

The Payne M. Co., operating at Rossland, has decided to erect a new compressor and concentrator. It is expected that a change in the management will be effected shortly.

It is rumored that the Canadian Smelting Works of Trail, now the largest producers of lead bullion in Canada, will proceed immediately with the construction of a lead refinery. It has not yet been decided whether these works will be located in the Kootenay district or on the Pacific coast or at some point on the Atlantic seaboard.

J. Dorsey, manager of the Lake Shore & British Columbia M. Co., Ltd., says that the shaft on the Blue Bell, in Summit camp, is to be sunk an additional 100 feet. His mission East is to present to the shareholders a proposition to purchase a diamond drill outfit to exploit the J. S. and also the Mountain View claim. He also hopes to arrange for the installation of a seven-drill compressor plant on the Blue Bell.

J. Dorsey, representing the Lake Shore C. M. & D. Co. at Lardeau, has made a payment of $4000 to Jarnel & Bower on a $27,000 bond on the J. S. claim, in Summit camp.

The Kootenay-Tacoma Co. of Tacoma is preparing to begin work on the Last Chance group, on Quartz creek, near Nelson.

The Snowshoe Mines, Ltd., has been organized in London for the purpose of taking over and operating the Snowshoe group at Phœnix. The capital is £250,000. For the last two years this group has been operated by the British Columbia (Rossland and Slocan) Syndicate, Ltd., of which G. S. Waterlow of London is chairman and A. J. McMillan managing director.

H. H. Robinson of Chicago is doing development work on the Lenora, a copper-galena property located on Jumbo fork of Toby creek, near Peterborough.

Probably one of the best known mining properties in Lardeau district is the Badshot group, upon which considerable work has been done and a Crown grant issued. F. Johnson has sold his one-fourth interest in the Badshot group, Lardeau district, to J. T. Black of New Denver.

ECUADOR.

A. A. Blow, a mining engineer, says: "One of the remaining rich mining districts of the world will be open in two years, when the railroad reaches Quito. My private reports have informed me of the discovery of alluvial gold fields in an unexplored part of Ecuador. We have not yet located the original lodes from which the alluvial deposits have been washed. Our prospectors have located rich placer mines after a hasty exploration of a few of the streams which flow into the headwaters of the Amazon."

MEXICO.

The Greene Con. M. Co. at La Cananea, Sonora, has just paid a dividend of 2% upon the capital stock. The treasurer's statement says that the ore smelted ending April 30th was 9808 tons. The copper matte produced was 3,533,550 pounds, and the pure copper contents was 1,368,500 pounds.

The Candelaria Co., operating in the Parral mining district, Sonora, will build a fifty-ton cyanide plant to handle the tailings from the concentrating mill. A considerable portion of the values are lost under the present system. The concentrating plant also is being enlarged to treat the increased production. W. B. Storer, one of the owners, says the development being carried forward at present consists in sinking the shaft, now 100 feet, to 150 feet. At the latter depth a level will be run off and the ore shoots disclosed in the upper workings will be opened and exploited.

The Natividad M. Co., operating in Oaxaca, expects soon to put up another 10-stamp mill.

The Alma copper mines, near Carbo, Sonora, have been bought by A. Graves of Denver, Colo., and W. R. Lewis of Des Moines, Iowa, who have commenced work on them.

At the San Francisco mine, near Llano, Sonora, J. C. Underwood manager, a cyanide plant is under consideration to treat the accumulated tailings.

THE KLONDIKE.

Owing to a heavy snowfall, there will be a good head of water for sluicing. The prospects for an enormous clean-up are bright. The formerly stated estimates of $25,000,000 to $30,000,000 hold good.

Personal.

JOHN HAYS HAMMOND is in Denver, Colo.

MARK B. KERR of Grass Valley, Cal., is in San Francisco.

FELIX CHAPELLET, JR., has returned from Mexico to San Francisco.

W. MILLER has been appointed Supt. Oriole quartz mine, Angels, Cal.

J. L. BRYSON has resigned as Supt. Yuba quartz mine, Maybert, Cal.

W. S. NOYES of San Francisco is in Mono county, Cal., examining mines at Castle Peak.

EDWARD BEHR has been appointed manager Golden Chest M. Co., at Murray, Idaho.

W. E. DOWNS, C. E., of Jackson, Amador county, Cal., is in San Francisco on a short visit.

M. L. SMITH, manager Roseburg gold mine, near Grizzly Flat, El Dorado county, Cal., is in San Francisco.

JAMES MCNAUGHTON has been appointed general manager Calumet & Hecla Co., at Houghton, Mich.

N. H. SCHEUER, formerly of Milwaukee, Wis., has accepted the position of Supt. Barnes mine, Gilpin, Colo.

C. E. WHITE, manager Nevada Copper Co., has returned from New York to the mines, near Lovelocks, Nev.

J. C. CHRISTENSON, Supt. Bradford quicksilver mine, Emmet, Cal., has gone on a six months' visit to Sweden.

ALFRED C. GARDE of Anaconda has been appointed general manager Payne silver mine, in Slocan district, B. C.

J. B. MILLER of French Corral, Cal., has been appointed Supt. San Francisco M. & T. Co., at Teller City, Alaska.

C. F. MERRY has been appointed general manager Montana M. & D. Co., recently organized at Spokane, Wash.

W. W. WAGGONER of Nevada City, Cal., has been appointed Debris Commissioner of California by Governor Gage.

A. A. BLOW, M. E., of New York, has taken a party of engineering assistants to Ecuador to examine a mining district near Quito.

E. C. ENGLEHARDT, late of Denver, Colo., has accepted the superintendency of the Middlemarch C. Co., at Middlemarch, Cochise county, Ariz.

J. E. TIBBITTS, M. E., field assistant to the State Mineralogist, will report on copper deposits in Humboldt, Mendocino, Lake and Sonoma counties.

L. CUMMINS, formerly at the La Mina Yaca, Sonora, Mexico, is now in charge of the cyanide plant of the Headlight mine, Carrville, Trinity county, Cal.

JOHN TREWEEK has returned to Salt Lake City, Utah, from France, where he has been in charge during the last year of a lead, silver and zinc mining company.

CHARLES E. AMES has been appointed by the California State Mineralogist assistant to his field assistant, F. M. Anderson, and has joined the latter in Shasta county, Cal., to assist in the preliminary preparation for the promised bulletin on copper.

H. S. MONROE, Professor of Mining at Columbia University, New York, is inspecting the Boston & Montana and Butte & Boston copper mines at Butte, Mont.

F. J. FRENCH, general manager Blue Jacket Con. C. Co., of the Seven Devils country, Idaho, is in New York on business with the head office of his company.

CHAS. S. LONG, field assistant to the State Mineralogist, is investigating copper deposits in Placer, El Dorado, Amador, Calaveras, Tuolumne and Mariposa counties.

P. C. DUBOIS, M. E., field assistant to the State Mineralogist, is examining copper deposits in Modoc, Lassen, Plumas, Sierra, Butte, Tehama, Yuba and Nevada counties.

FRANK C. CALKINS of the University of California has ranked first in the recent examinations of University students for appointment as field assistants in the U. S. Geological Survey.

JOHN T. ALLEN, general manager Mexican G. & S. Recovery Co. of the City of Mexico, is visiting the Colorado-Ures mine, at Hermosillo, Sonora, Mexico, which is operated by the company.

Books Received.

"Petroleum Series — Bulletin No. 4, April, 1901 — The Dutton, Rattlesnake, Arago, Oil Mountain and Powder River Oil Fields," by Prof. W. C. Knight and Prof. E. E. Slosson of the School of Mines, University of Wyoming, Laramie, Wyo., 57 pages of text and tables, with maps, is a carefully prepared, well expressed article on some of the possible petroleum fields of Wyoming. It comes in a good season, too, just as promoters are about to try to repeat in Wyoming the oil prospectus exploitation that California and Texas have suffered from. It would be well for every intending investor in Wyoming oil shares to read this bulletin first. It may not touch the field of their proposed investment, but will furnish facts regarding Wyoming petroleum possibilities that should not be disregarded.

"British Columbia" is the title of a pamphlet prepared by Richard McBride, Minister of Mines, Victoria, B. C., for free distribution at the Glasgow and Buffalo Expositions. It is an exceedingly well prepared volume, full of just the information that people would desire of the mines and mining of the Province, expressed clearly and briefly and without exaggeration or word padding. The illustrations are well chosen in subjects and superior in execution. The map of the Province accompanying the pamphlet should be revised. It is quite inaccurate and evidently carelessly compiled. Circulated at Glasgow, it would tend to inculcate unnecessarily false geographical ideas. On the map Skaguay, Haines, Pyramid, on the Lynn Canal, Ketchikan, on Revillagigedo Island, a number of smaller towns and a trifle of 10,000 square miles of Alaska are colored and marked just as if they were really part of British Columbia. The circulation from Buffalo of the carelessly prepared map is of little consequence. It will be overlooked or considered as a Canadian map maker's humor. But the Scotch are serious people.

Commercial Paragraphs.

THE Jeanesville Iron Works Co., Jeanesville, Pa., have taken an order from the Iron Silver mine at Leadville, Colo., for a compound condensing pump for 900 feet lift. They have just delivered one to the Vindicator Mines at Independence, Colo., for 1200 feet lift.

THE Ericsson Telephone Co. of 296 Broadway, New York, has issued in attractive form a reproduction of four interesting photographs of its foreign factories and of foreign exchanges using the telephones, one of the latter being in Shanghai, China, employing Chinese operatives. The reproduction will be mailed to telephone exchanges on request.

MESSRS. DEWEY, STRONG & CO., patent attorneys and solicitors, announce that they are prepared to handle business direct from either Washington or San Francisco. Mr. Geo. H. Strong, who has been the guiding head of the firm for over thirty years, has found it necessary, with the increase of business, to establish a fully equipped branch in Washington. This will also serve the interest of many inventors who feel that they live at too great a distance from the home office, and, in order to save time, prefer to communicate direct with Washington. Mr. T. Walter Fowler, who has been the Washington representative of the firm for many years, and is well known to numbers of the clients of the firm, assumes the management of the new office.

Latest Market Reports.

SAN FRANCISCO, June 6, 1901.

SILVER--Per oz., Troy: London, 27 7-16d (standard ounce, 925 fine); New York, bar silver, 59⅝c (1000 fine); San Francisco, 59⅝c; Mexican dollars, 50c San Francisco, 48c New York.

COPPER.—New York: Lake, 1 to 3 casks, $17.25; carload lots, $17.00; Electrolytic, 1 to 3 casks, $16.75; carload lots, $16.62½; Casting, 1 to 3 casks, $16.60; carload lots, 16.50. San Francisco: 18. Mill copper plates, 20c; bars, 22@23c. London: £69 6s 3d per ton.

LEAD.—New York, $4.37½; Salt Lake City, $4.00; St. Louis, $4.32½; San Francisco $4.90, carload lots; 5½c 1000 to 4000 lbs.; pipe 6, sheet 6½, bar 5½c; pig, $5.25. London, £12 8s 9d per ton=2.70 cents per lb.

SPELTER. — New York, $4.20; St. Louis, $3.75; London, £16 2s 6d per ton =3.58½ cts. per lb; San Francisco, ton lots, 5½c; 100-lb lots, 6c.

ANTIMONY.—New York, Cookson's, 10c; Hallett's, 9c; San Francisco, 1000-lb. lots, 10c; 300 to 500 lbs., 11c; 100-lb. lots, 13@15c.

IRON.—Pittsburg, Bessemer pig, $17.25; gray forge, $16.50; San Francisco, bar, per lb., 2.65c in small quantities.

STEEL.—Bessemer billets, Pittsburg, $24; open hearth billets, $27.00; San Francisco, bar, 7c to 12c per lb.

TIN.—New York, pig, $26.00; San Francisco, ton lots, 30c; 1000 lbs., 30½c; 500 lbs., 30½c; less, 31c; bar tin, ₱ lb, 34½c.

QUICKSILVER. — New York, $51.00 large lots; London, £9 2s 6d; San Francisco, local, $47.00 ₱ flask of 76½ lbs.; Export, $45.00

MAGNESIUM.—New York, $2.90 ₱ lb.; San Francisco, $3.75.

ZINC.—San Francisco, 5½c; slab, 5¾c; bar, 7c; zinc dust, N. Y., 8c.

BABBITT METAL.— San Francisco, No. 1, 10c.

SOLDER. — Half-and-half, 100-lb. lots, 19c; San Francisco, Plumbers', 100-lb. lots, 15¾c.

PHOSPHORUS. — F. o. b. New York 50@60c ₱ lb.

ASSAY LITHARGE.—San Francisco, 10c ₱ lb, small lots.

BISMUTH.—New York, ₱ lb., $2.25 50-lb lots; San Francisco, $2.50 to $2.75 lb lots.

PLATINUM.—San Francisco, crude, $22 ₱ oz.; New York, $22 per Troy oz

FERRO-MANGANESE. — Pittsburg, 80%, domestic, $62.50, large lots.

ALUMINUM.—New York, No. 1, 99% pure ingots, 35c; No. 2, 90%, 30c to 35c.

TUNGSTEN.—New York, ₱ lb., 95c; San Francisco, $1.15.

FERRO-TUNGSTEN. — New York, 37%, 32c; San Francisco, 65c (60%).

NICKEL.—New York, 50@60c ₱ lb.

POWDER.—F. o. b. San Francisco: No. 1. 70% nitro-glycerine, per lb., in carload lots, 15½c; less than one ton, 17½c. No. 1*, 60%, carload lots, 13½c; less than one ton, 15½c. No. 1** 50%, carload lots, 11½c; less than one ton, 13½c. No. 2, 40%, carload lots, 10c; less than one ton, 12c. No. 2* 35%, carload lots, 9½c; less than one ton, 11½c. No. 2** 30% carload lots, 9c; less than one ton, 11c. Black blasting powder in carload lots, minimum car 728 kegs, $1.50 per keg; less car lots, $2 per keg.

CAPS.—3x, $5.50 per 1000; 4x, $6.50; 5x, $8; Lion, $9, in lots not less than 1000.

FUSE.—Triple tape, $3.60 per 1000 feet; double tape, $3.00; single tape, $2.65; Hemp, $2.10; Cement No. 2, $3.00; Cement No. 1, $2.65, in lots of 3000 feet and up.

CANDLES.—Granite 6s, 16 oz., 40s., 10½c ₱ set; 14 oz., 40s., 9½c.

CHEMICALS.—Cyanide of potassium, 98%-99%, jobbing, 32½@33½c ₱ lb.; carloads, 30@31c; in 10-lb. tins, 40c; sulphuric acid, in carboys, 66% B, 2c ₱ lb.; soda ash, $1.90 ₱ 100 lbs. 58%; hyposulphite of soda, 2¾@3c ₱ lb.; blue vitriol, 5¾@6½c ₱ lb.; borax, concentrated, 7@8c ₱ lb.; chlorate of potash, 12@13c; roll sulphur, 6c; alum, $1.90@2.00; flour sulphur, French, 2½@ 2½c; California refined, 1¾@2c; nitric acid, in carboys, 8c ₱ lb.; caustic soda, in drums, 3@4c ₱ lb.; Cal. s. soda, bbls., $1.00; sks, 95c ₱ 100 lbs.; chloride of lime, spot, $2.50@2.60; nitrate of potash, in kegs, 8c: caustic potash, 10c in 40-lb. tins.

OILS.—Linseed, pure, boiled, bbl., 75c; cs., 80c; raw, bbl., 73c; cs., 78c. Deodorized Stove Gasoline, bulk, 14½c; do., cs., 20½c; 86° Gasoline, bulk, 20c; do., cs., 26c; 63° Naphtha or Benzine, deodorized, in bulk, per gal., 13½c; do., in cs., 19½c; Lard Oil, Extra Winter Strained, bbl., 75c; cs., 80c; No. 1 bbl., 50c; cs., 55c. Neatsfoot Oil, coopers' bbls., 60c; cs., 65c; No. 1 bbl., 50@52½c; cs., 55@57½c.

COAL. — San Francisco, coast, yard prices: Wellington, $9; Seattle, $7.00; Coos Bay, $5.50; Southfield, $9.00. Cargo lots, Eastern and foreign: Wallsend, $8.00; Brymbo, $7.50; Pennsylvania, hd., $14.00; Scotch, $8; Cumberland, $12; Cannel, $9.50; Welsh Anthracite, $12.00; Rock Springs, $8.50; Colorado Anthracite, $14.50. Coke, $16 per ton in bulk; $18 in sacks.

Catalogues Received.

The Jeffrey Manufacturing Co. of Columbus, O., have issued Circular No. 61, "Elevating and Conveying Machinery." It consists principally of illustrations of the many different devices applicable to the different classes of work required of such machinery.

The Robins Conveying Belt Co. of 15-21 Park Row, New York, have issued a pamphlet entitled "Coal Handling," handsomely illustrated with views of their system in operation, handling coal at breakers, washeries, power houses and under all the usual commercial conditions. They will mail the book on application.

Recently Declared Mining Dividends.

	Payable.
Touraine G. M. Co., Colo., ¾ cent per share, $11,000	June 1
Breece G. M. Co., Colo., $10,000	June 1
North Star M. Co., B. C., 3 cents per share, $39,000	June 15
Bunker Hill & Sullivan M. & C. Co., Idaho, $21,000	June 4
Tamarack C. M. Co., Michigan, $10 per share, $600,000	June 28
New Zealand Con. Co., Colorado, 1 cent per share	June 25
Consolidated Mines Co., Colorado, 1 cent per share, $19,000	June 25
Winnie Leasing Co., Colorado, 3 cents per share, $7500	June 15

Notices of Recent Patents.

Among the patents recently obtained through Dewey, Strong & Co.'s SCIENTIFIC PRESS U. S. and Foreign Patent Agency, the following are worthy of special mention:

FLOATING FISH TRAP.—No. 675,045 May 28, 1901. R. B. Kittredge, San Francisco, Cal. The object of this invention is to provide a trap for catching fish in large quantities. It consists of a net having the upper edges provided with buoys or floats, and the intermediate portion weighted to swing down to the bottom of the waterway; transverse connecting lines extending between the sides, and outwardly extending anchor lines by which the sides are maintained parallel and in the desired position. There is an opening near the inlet end and guides or leads by which fish are directed therein, and a closable gate in advance of the inlet to retain the fish in the net. The discharge end of the net has a convergent tapering covered portion.

EXCAVATOR.—No. 675,046. May 28, 1901. Henry Lough, San Francisco, Cal. This invention is designed to provide a device for excavating either in dry soil or for dredging in river beds. It comprises a float or support, a tramway suspended therefrom having the upper arm extending in approximately straight lines, and the lower end curved into an arc of a circle. Cables support the outer end of the arc, a carriage is mounted upon rollers adapted to travel upon the tramway, a hinged swinging scoop suspended from the carriage with ropes and cables connecting the front and rear, guide pulleys over which they pass and winding drums so that the carriage and scoop may be caused to travel back and forward upon the tramway.

New Patents.

DEWEY, STRONG & CO.'S SCIENTIFIC PRESS PATENT AGENCY, 330 Market St., S. F., has official reports of the following U. S. patents issued to Pacific coast inventors:

FOR THE WEEK ENDING MAY 28, 1901.

675,314.—DUMB-BELL—F. B. Abenheim, S F.
675,312.—WOOD GRAINING—B. W. Augustine, Alameda, Cal.
675,123.—EXTRACTING GOLD—G. S. Bartholomew, Los Angeles, Cal.
675,319.—ROCK DRILL—W. S. Boyd, 3rd, Los Angeles, Cal.
675 264.—ORE PULVERIZER—A. C. Calkins, Los Angeles, Cal
675,265 —GYRAT RY MULLER—A. C. Calkins, Los Angeles, Cal.
674,997.—SAW SHIFTER—E. Christensen, Portland, Ogn.
675,2 1 —BOAT—W. A. Douglas, Monroe, Wash.
675,365.—RAILWAY SIGNAL—W. D. Farren, Newman, Cal.
675,093.—WAVE MOTOR—J. J. Graff, S. F.
675,212 —REGISTERING APPARATUS—L. H. Handy, S. F.
675,281.—FURNACE.—A.W. Johnson, Tacoma, Wash
675,045.—FLOATING FISH TRAP—D. B. Kittredge, S. F.
675,227 —CAR STAKE—Lister & Bordeaux, Olympia, Wash.
675,046.—EXCAVATOR—H. Lough S. F.
674,925.—WHEEL—G W Lovejoy, Tahachapi, Cal.
675,358.—BICYCLE SUPPORT — A. McCollum, San Jose, Cal.
675,252.—SCABBARD — G. R. Simmons, French Gulch, Cal.
675,308.—HOSE LEAK STOP—J. M. Voss, Los Angeles, Cal.
675,075.—WINDMILL—E. Warren, San Marcos, Cal.
675 256.—DUST PAN—F. F. Wellenman, Hollister, Cal.
674,892.—FILE HOLDER—O. R. Whitten, Prescott, Ariz.

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DELINQUENT SALE NOTICE.

AMERICAN OIL AND REFINERY COMPANY.—Location of principal place of business, San Francisco, California; location of works, Contra Costa County, California.

NOTICE.—There are delinquent upon the following described stock, on account of assessment (No. 3) levied on the 26th day of March, 1901, the several amounts set opposite the names of the respective shareholders, as follows:

Names.	No. Cert.	No. Shares.	Amt.
Allen, S. L.	110	12	$ 60
Anderson, Mrs. Lulu	270	2	10
Anthony, J. C., Trustee	797	1,000	50 00
Anthony, J. C., Trustee	798	1,000	50 00
Anthony, J. C., Trustee	799	1,000	50 00
Anthony, J. C., Trustee	800	500	25 00
Anthony, J. C., Trustee	801	500	25 00
Anthony, J. C., Trustee	802	500	25 00
Anthony, J. C., Trustee	803	500	25 00
Anthony, J. C., Trustee	531	500	25 00
Anthony, J. C., Trustee	973	1,000	50 00
Anthony, J. C., Trustee	1021	4,300	215 00
Avery, Mrs. Jennie	716	5	25
Avery, Mrs. Jennie	729	5	25
Barto, Harrison	468	2,500	125 00
Barto, Harrison	812	500	25 00
Barto, Harrison	813	500	25 00
Barto, Harrison	814	500	25 00
Benecke, Diederich	93	1	05
Bgorkman, Mrs. Augusta	712	35	1 75
Brown, Mrs. Ida M	152	7	35
Buckley, Morris	788	50	2 50
Carr, H. W.	719	5	25
Conn, Mrs. Sarah A.	529	20	1 00
Conn, Mrs. S. A	693	25	1 25
Corbiere, C. C.	564	250	12 50
Corbiere, C. C.	565	5	25
Crew, L. T.	236	2	10
Cridge, A. D.	503	1	05
Cumberson, Mrs. Maria L.	171	5	25
Donnelly, Mary M.	49	14	70
Dunlap, Mrs. W. B.	526	10	50
Donahue, Benj. S.	1141	500	25 00
Eells, Charles P.	984	2,000	100 00
Eells, Charles P.	1127	10,000	500 00
Est. y, J. C.	1045	100	5 00
Estey, J. C.	1048	20	1 00
Falls, Sarah	557	40	2 00
Fetrow, Mrs Maria W	172	3	15
Fisk, Andrew J.	366	2	10
Freese, A. J.	6	40	2 00
Freese, A. J.	7	40	2 00
Freese, A. J.	9	50	2 50
Freese, A. J.	2 8	10	50
Freese, A. J.	279	10	50
Freese, A. J.	280	20	1 00
Freese, A. J.	281	20	1 00
Freese, A. J.	282	20	1 00
Freese, A. J.	283	20	1 00
Freese, A. J.	284	345	17 25
Freese, A. J.	450	20	1 00
Freese, A. J.	659	50	2 50
Freese, A. J.	671	9	45
Hildebrandt, Henry	256	65	3 25
Hildebrandt, Henry	257	100	5 00
Hildebrandt, Henry	258	1,000	50 00
Hoover, John D., Trustee	981	667	33 35
Hoover, John D., Trustee	1060	433	21 65
Hoover, Miss Esther	979	100	5 00
Holbrook, W. E., Trustee	897	10,000	500 00
Holbrook, W. E., Trustee	898	11,000	550 00
Holbrook, W. E., Trustee	899	4,500	225 00
Holbrook, W. E., Trustee	900	4,500	225 00
Holbrook, W. E., Trustee	958	2,000	100 00
Holbrook, W. E., Trustee	959	2,000	100 00
Holbrook, W. E., Trustee	960	2,000	100 00
Holbrook, W. E., Trustee	974	2,000	100 00
Holbrook, W. E., Trustee	994	1,200	60 00
Holbrook, W. E., Trustee	995	1,000	50 00
Holbrook, W. E., Trustee	996	1,000	50 00
Holbrook, W. E., Trustee	997	1,000	50 00
Holbrook, W. E., Trustee	998	1,000	50 00
Holbrook, W. E., Trustee	999	1,000	50 00
Holbrook, W. E., Trustee	1000	1,000	50 00
Holbrook, W. E., Trustee	1001	1,000	50 00
Holbrook, W. E., Trustee	1118	2,000	100 00
Holbrook, W. E., Trustee	1119	2,000	100 00
Holbrook, W. E., Trustee	1123	2,000	100 00
Kessing, E. L.	838	15	75
Lucas, Mrs. T. R.	848	10	50
McCuen, Mrs. N.	305	2	10
McAllister, H. L.	1071	100	5 00
Murrey, Peter William	70	1	05
Niederost, August	207	28	1 40
Opitz, Conrad E.	343	10	50
Peters, W. S.	60	15	75
Peters, W. S.	334	500	25 00
Peters, W. S.	673	5	25
Pipher, Jos. E.	102	2	10
Reynolds, Timothy	21	5	25
Schindler, Louis C.	303	2	10
Shead, Mrs. Dora L	920	100	5 00
Smith, James B., Trustee	985	1,000	50 00
Smith, James B., Trustee	986	1,000	50 00
Smith, James B., Trustee	987	1,000	50 00
Smith, James B., Trustee	988	1,000	50 00
Smith, James B., Trustee	989	1,000	50 00
Smith, James B., Trustee	990	1,000	50 00
Smith, James B. Trustee	991	1,000	50 00
Smith, James B., Trustee	992	500	25 00
Tarpey, W. J.	675	14	70
Walser, Mrs. Lizzie	332	125	6 25
Young, Richard	746	91	4 55
Young, Richard	754	167	8 35
Young, Richard	758	100	5 00
Young, Richard	761	328	16 40

And in accordance with law, and an order from the Board of Directors, made on the 26th day of March, 1901, so many shares of each parcel of such stock as may be necessary, will be sold at public auction at the office of said corporation, in Rooms 322-323 Parrott building, San Francisco, California, on MONDAY, the 27th day of May, 1901, at the hour of 1 o'clock P. M. of said day, to pay said delinquent assessment thereon, together with costs of advertising and expenses of sale.

J. C. ANTHONY, Secretary.

Office—Rooms 322-323 Parrott building, 325 to 355 Market St., San Francisco, California.

POSTPONEMENT.

By order of the Board of Directors, the day of sale of the above delinquent stock has been postponed to MONDAY, the 24th day of June, 1901, at the hour of 1 o'clock P. M., at the office of said corporation in Rooms 322-323 Parrott building, San Francisco, California.

J. C. ANTHONY, Secretary.

Office—Rooms 322-323 Parrott building, 325 to 355 Market St., San Francisco, California.

DELINQUENT SALE NOTICE

NATIONAL CONSOLIDATED MINING COMPANY.—Location of principal place of business, San Francisco, California; location of works, Rich Gulch, Shasta County, California.

Notice.—There are delinquent upon the following described stock on account of assessment (No. 14) levied on the 16th day of April, 1901, the several amounts set opposite the names of the respective shareholders, as follows:

Names.	No. Cert.	No. Shares.	Amt.
F. Strueven	163	20	1 00
T. Vogel	227	150	7 50

And in accordance with law, and an order from the Board of Directors, made on the 16th day of April, 1901, so many shares of each parcel of such stock as may be necessary will be sold at public auction at the office of the company No. 773 Mission street, San Francisco, California, on TUESDAY, the 25th day of June, 1901, at the hour of 1 o'clock P. M. of said day, to pay said delinquent assessment thereon, together with costs of advertising and expenses of sale.

GEO. W. FLEISSNER, Secretary.

Office—773 Mission street, San Francisco, California.

FOR SALE.

FOR SALE.

The irons for a heavy pump bob, formerly used on 5-inch Jackhead pump, including cast bearing for elbow joint, with bolts and straps; cost $160; will be sold for $75 cash. Address IRA HILL REED, San Andreas, Cal.

FOR SALE.---1200 feet of 12-in. Steel Pipe, No. 14 gauge, in good condition.

Inquire PORT COSTA WATER CO., 326 California St., San Francisco, Cal.

Valuable Hydraulic Mining Property,

located in Plumas County, Cal., containing 273 acres, title U. S. patent, water rights, ditches, etc., FOR SALE AT A BARGAIN. Terms easy. For further particulars, apply to ALMARIN B. PAUL, 27 Crocker Building, San Francisco, Cal.

Valuable Gold-Copper Property,

5 Miles from Callahans, Siskiyou Co., for Sale.

36 tons shipped to Selby's went 18% copper, $6 gold and silver. 136 tons shipped to Keswick went $800 copper and gold. Shaft 40 feet. Other development work. Good road. Abundant water and timber. B. K. COLLIER, Etna Mills, Cal

FOR SALE.

ONE COMPLETE PLACER MINING DREDGE

OF THE ELEVATOR TYPE.

With buckets having capacity of seven and a half cubic feet. Dredge only used few months. Located on Grasshopper creek, near Bannack, Mont. For full particulars, address THE BUCYRUS COMPANY, South Milwaukee, Wis.

TO ASSAYERS.

A fine set of assay scales with pulp balance, and set of assay ton weights, all in good order, will be sold for $125, if applied for soon. The outfit consists of one Troemner's No. 5 balance with aluminum beam and agate bearings, mounted in glass case with sliding doors and plate glass bottom, original cost $175; also one Becker's pulp balance No. 18, with 8-inch beam, mounted in glass case with sliding doors, costing $26. Further particulars by addressing Box 4, San Andreas, Cal.

SECOND-HAND MACHINERY.

PULLEYS, SHAFTING, BELTING, BOXES, BOILERS, ENGINES, HOISTERS, STAMP MILLS, RAILS, CABLE—all but little used.

THE S. S. MACHINERY CO.,

Sixth and Market Sts, DENVER, COLO.

SEND FOR DESCRIPTIVE CIRCULAR.

Attention of Mining Men

and others is invited to the

DEAN-OVIATT ORE ROASTER AND DESULPHURIZER.

WELL WORTH YOUR INVESTIGATION!

Interest For Sale.

OFFICE, 321 PHELAN BLDG, SAN FRANCISCO.

BRITISH COLUMBIA MINES

Gold, Silver-Lead and Copper Properties. Excellent chance for profitable investments in legitimate mining in BRITISH COLUMBIA. Capital needed for developing promising prospects. A specialty made of FREE MILLING GOLD properties. Very promising FREE MILLING GOLD properties for sale; terms reasonable. Mines examined and reported on by reliable mining engineers. Correspondence solicited Address Andrew F. Rosenberger, P. O. Box 700, Nelson, B. C.

WE BUY very rich Ores, Dental Scraps, Tellurium Ores, Mill Wastes, Jewelers' Sweeps, Gold Retorts, Old Iron Retorts, Base Amalgam, Quicksilver, Amalgamated Plates, Gold and Silver, Old Slags.

A. M. DONALDSON & CO.,

ASSAYERS AND WASTE PRODUCT SMELTERS, 1661 Larimer St., Denver, Colo.

Donaldson's Assayers' Slag Hammer {1lb.....$1.10 / 1lb. 8oz. $1.25}

ARE YOU GOING EAST THIS SUMMER?

If you are going to the Pan-American Exposition at Buffalo, or to Cincinnati, Detroit, Chicago, Milwaukee, or any point in the East, write or call upon Mr. D. W. Hitchcock, General Agent Union Pacific R. R. Co., No. 1 Montgomery St, San Francisco, in regard to reduced round trip rates to these points. Three trains via this route leave California daily. The time of the "Overland Limited" to Chicago is less than 3 days and to Buffalo 3½ days, which is nearly a day quicker than any other line.

THE CALIFORNIA DEBRIS COMMISSION, having received applications to mine by the hydraulic process from A. Lundberg, in the Joseph Thomas Mine, at Plymouth, Amador Co., to deposit tailings in Indian Creek, and from S. I. Simmons et als., in the Victor Placer Mine, in Negro Canyon, Sierra Co., to deposit tailings in Charcoal or Negro Creek, gives notice that a meeting will be held at Room 59, Flood Building, San Francisco, Cal., on June 24, 1901, at 1:30 P. M.

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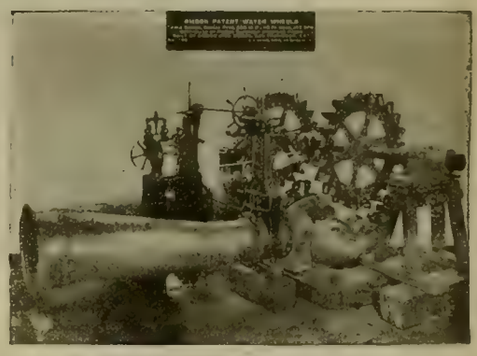

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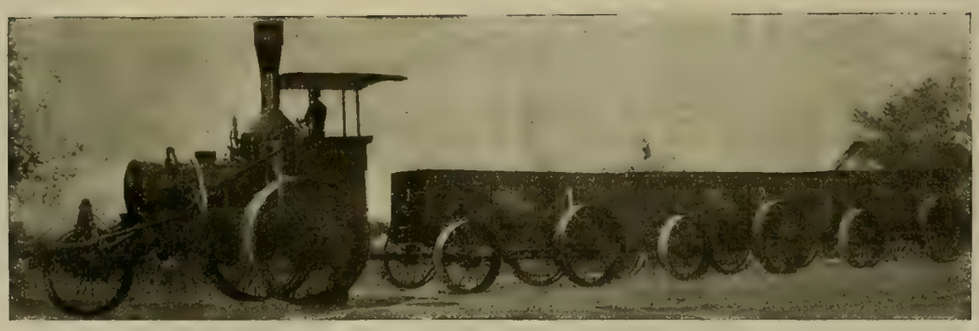

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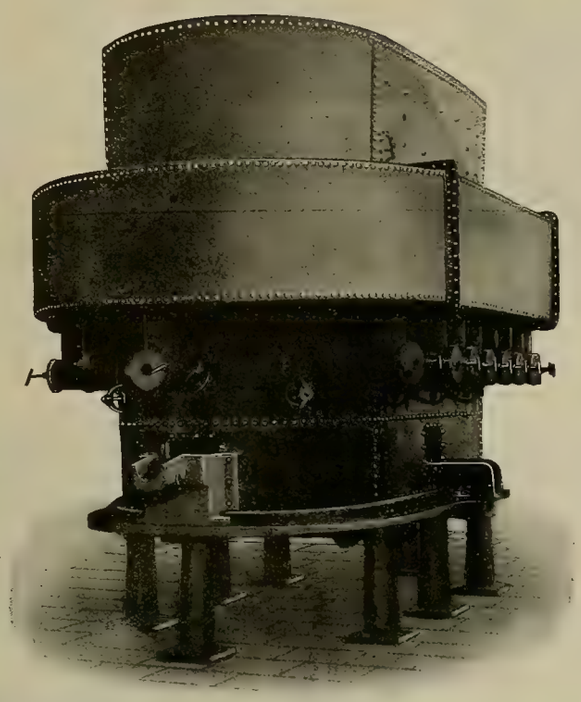

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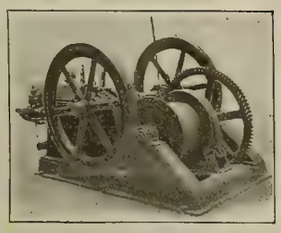

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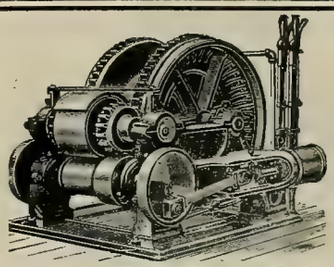

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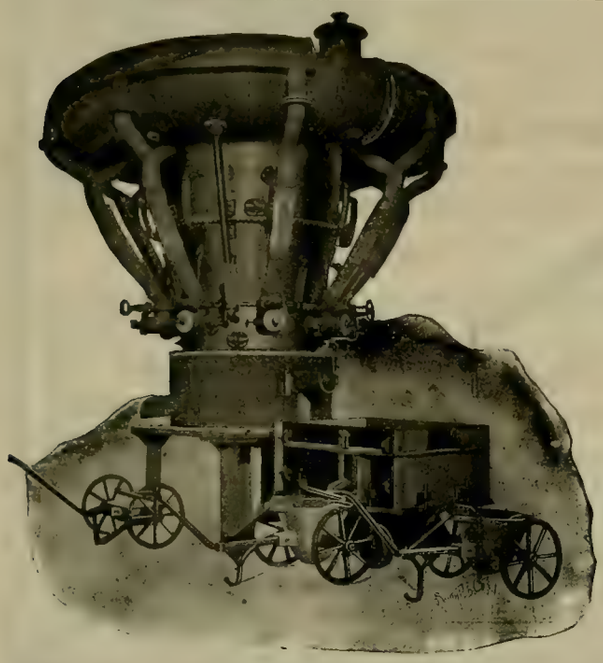

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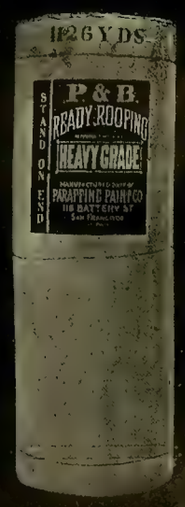

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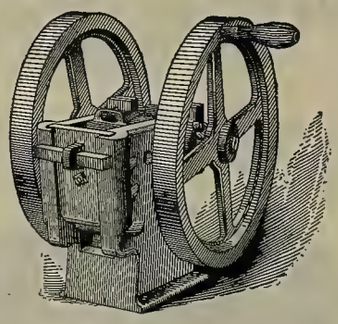

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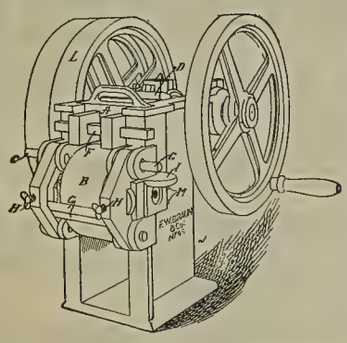

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Gauge pressure, actual	275 lbs.	Diameter of pump cylinder	5 in.
" " theoretical	278.14 "	Net area of pump cylinder after deducting area of piston	17.868 sq. in.
Barometer at pump	29.58 in.	Efficiency of pump when working under above conditions	84.80 per ct.
" " point of discharge	28.95 "		
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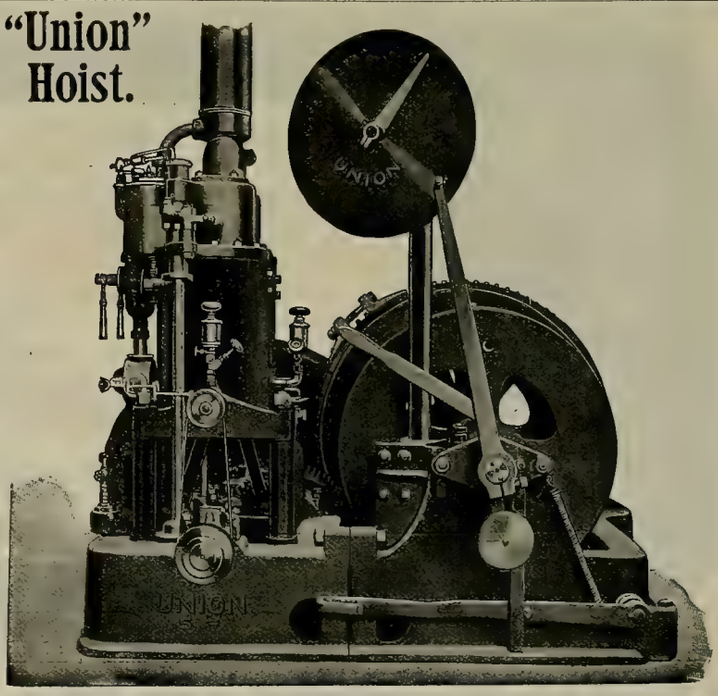

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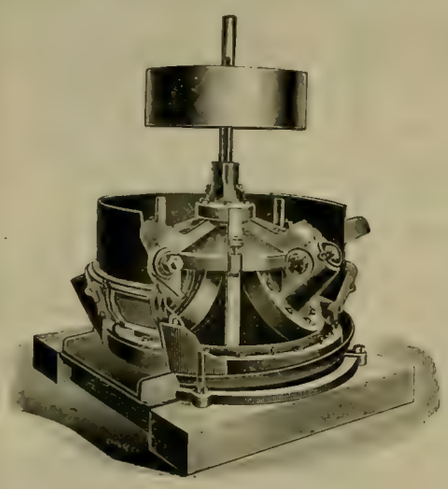

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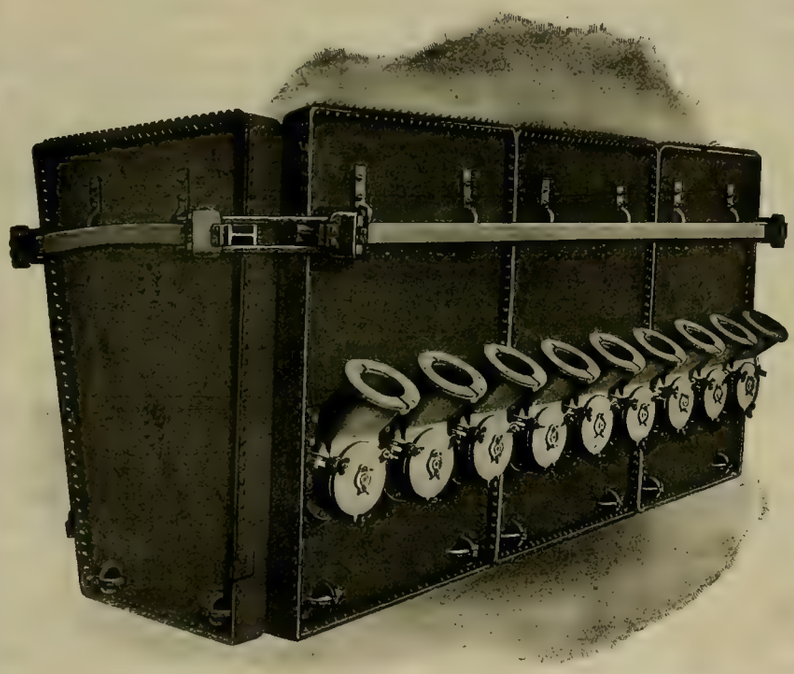

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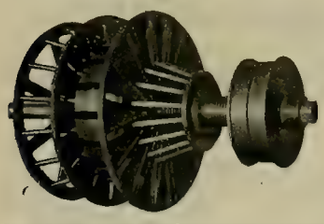

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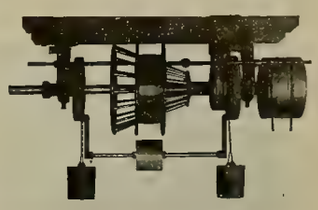

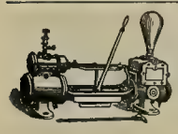

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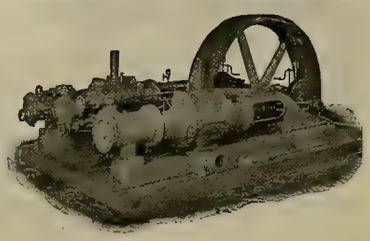

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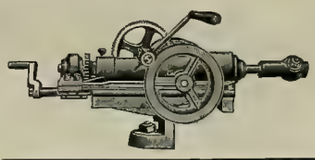

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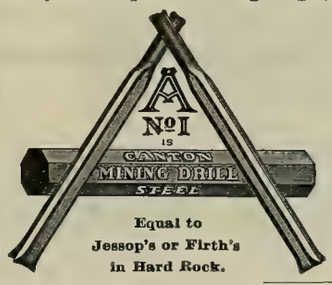

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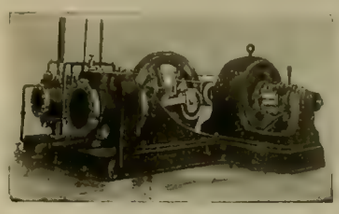

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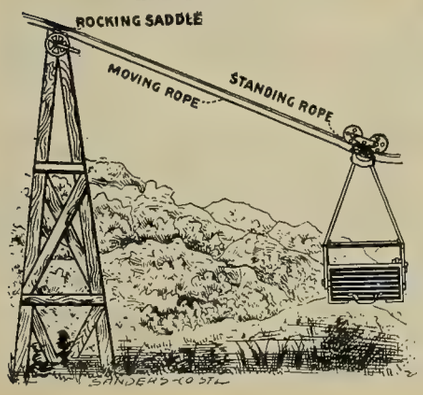

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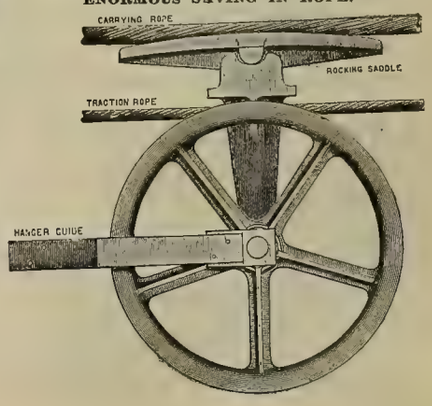

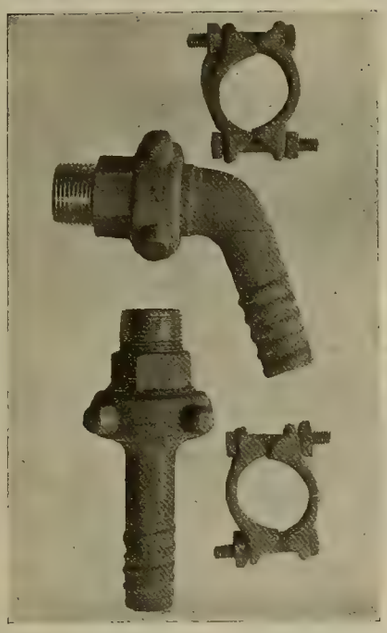

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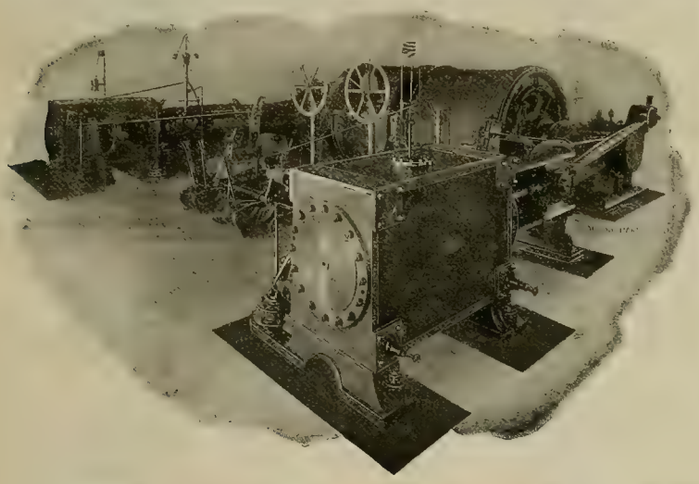

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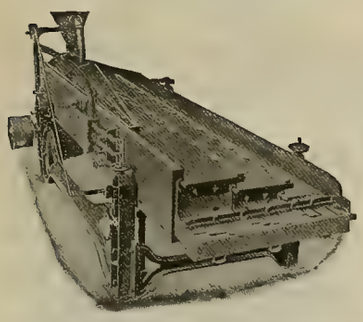

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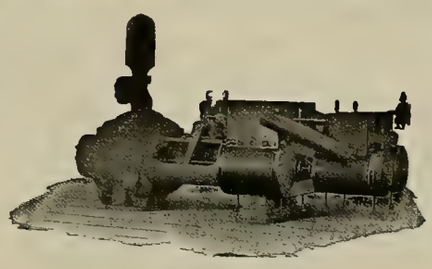

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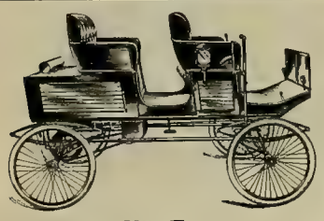

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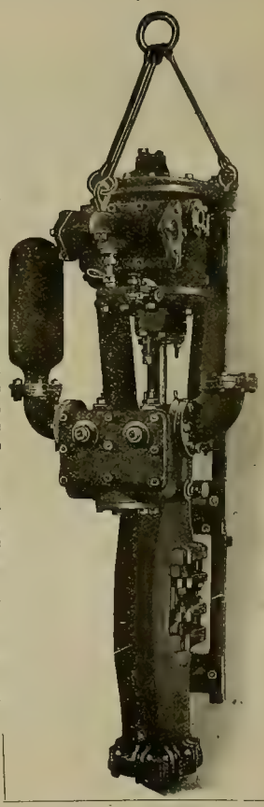

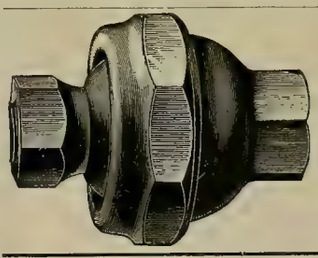

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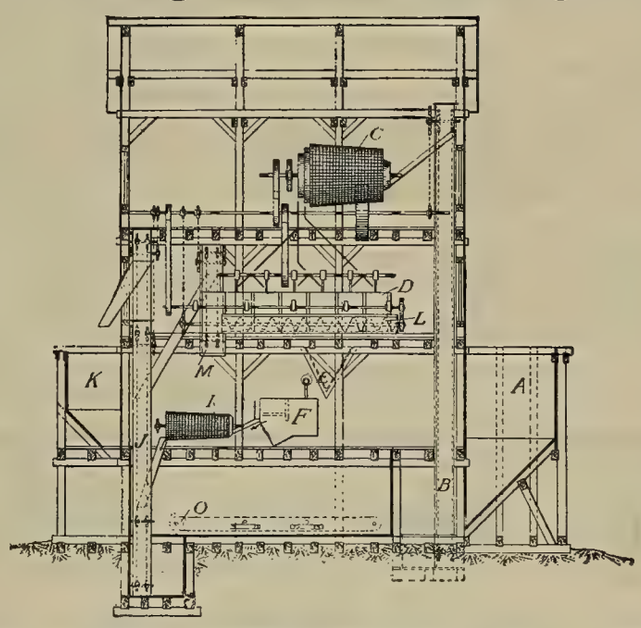

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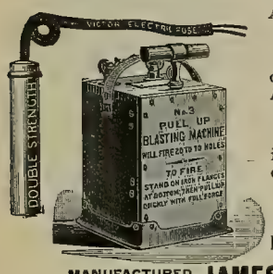

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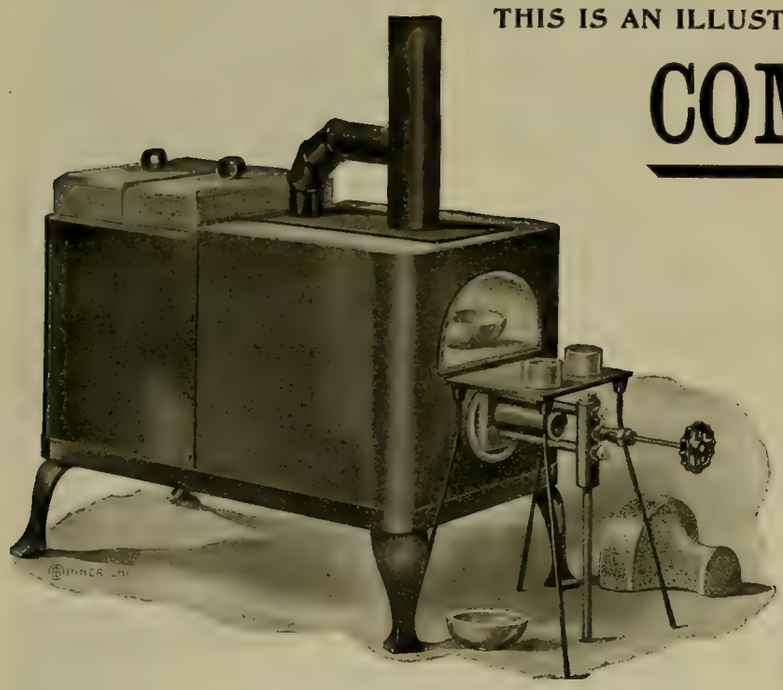

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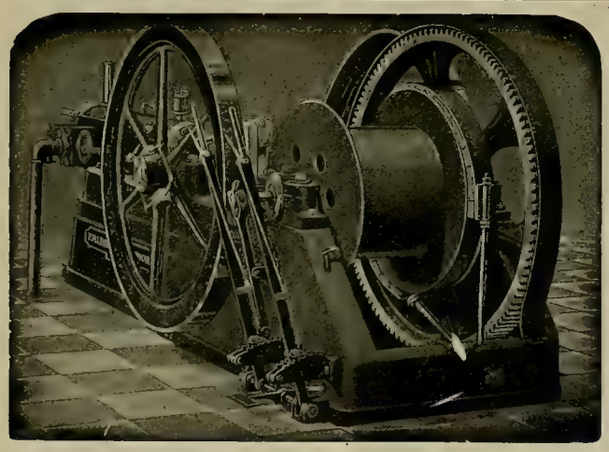

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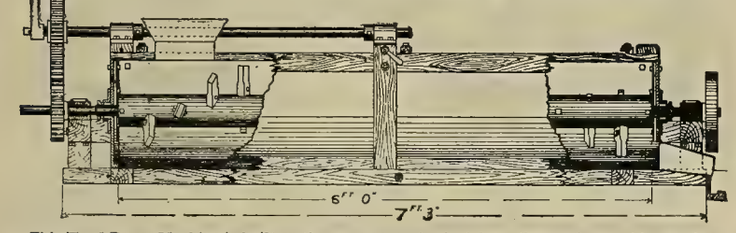

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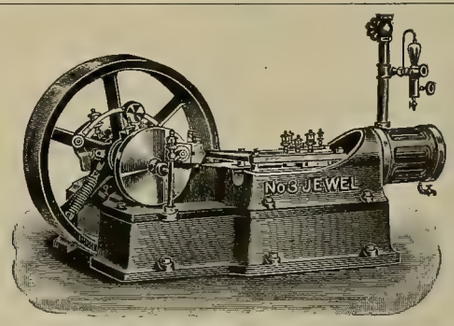

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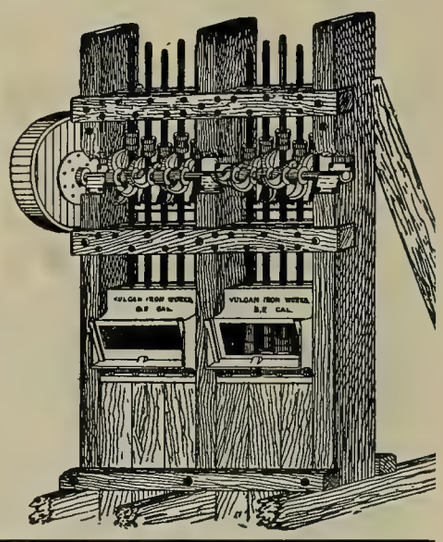

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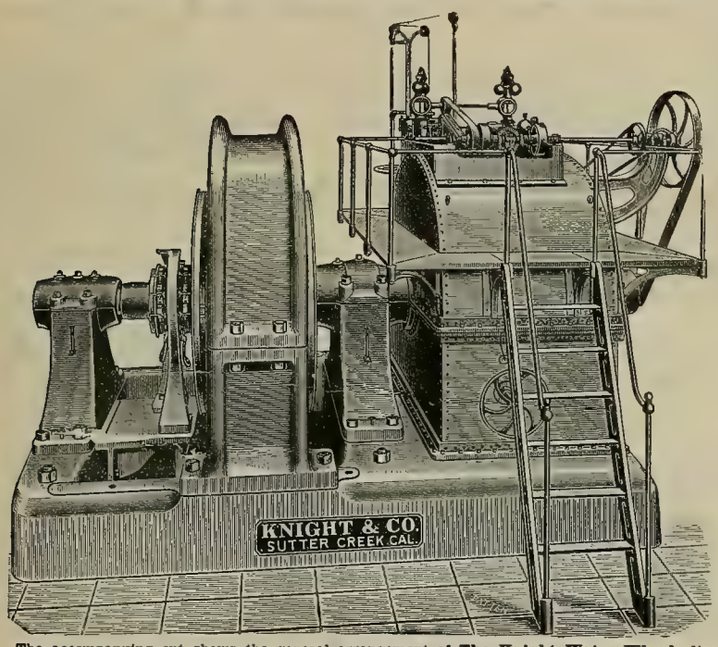

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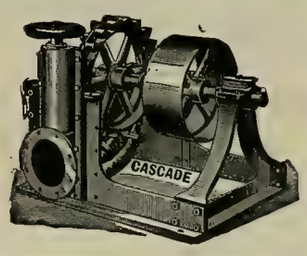

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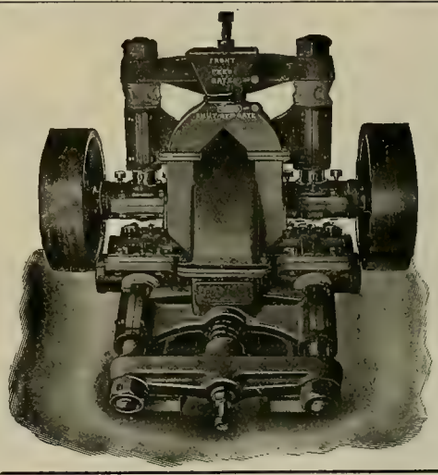

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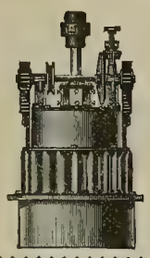

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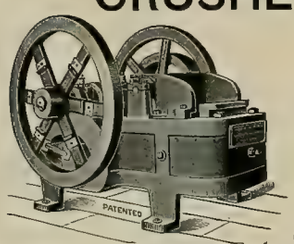

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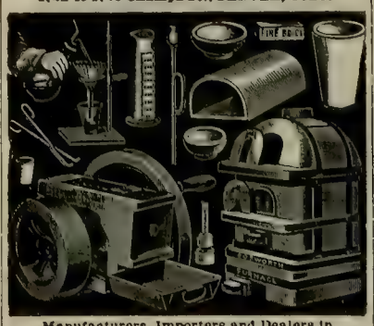

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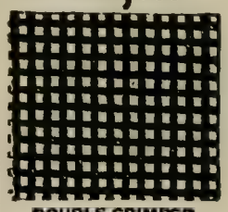

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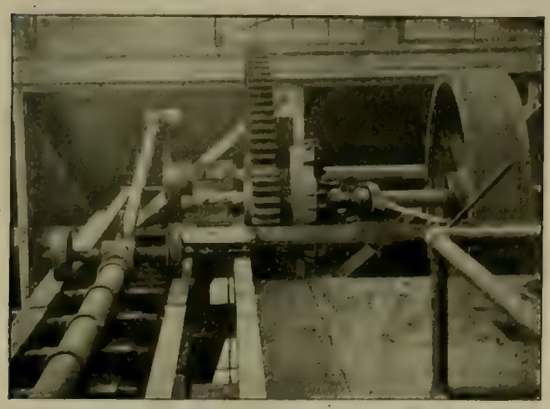

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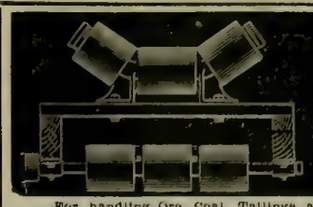

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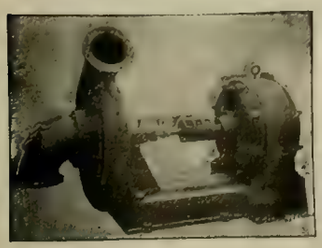

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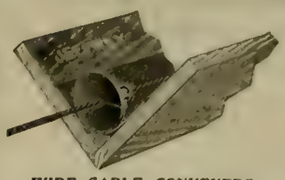

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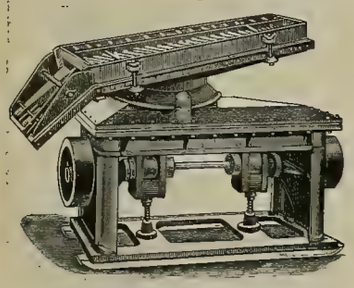

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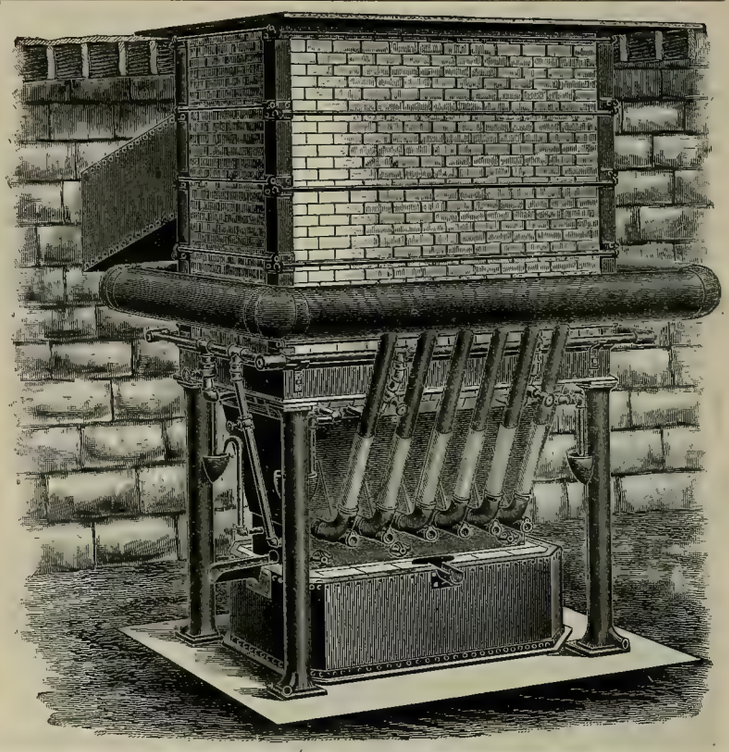

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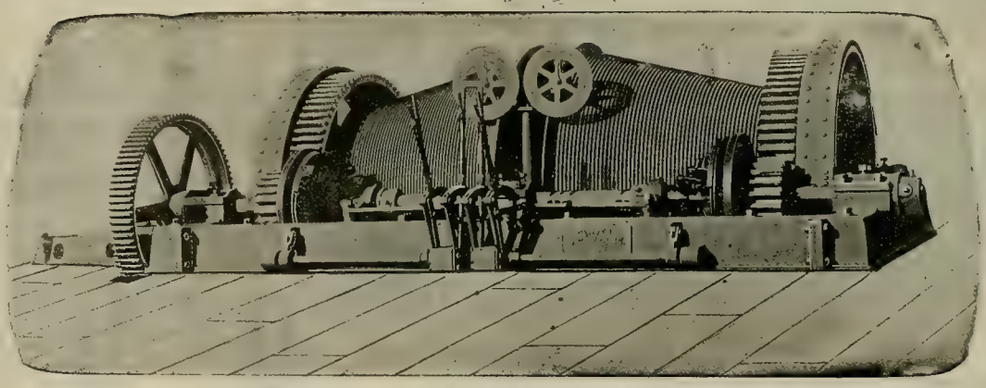

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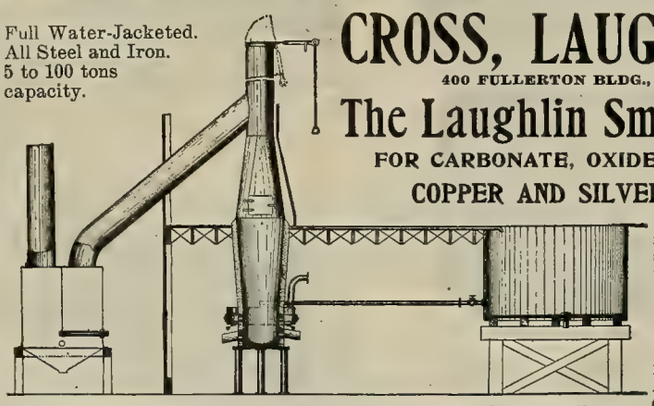

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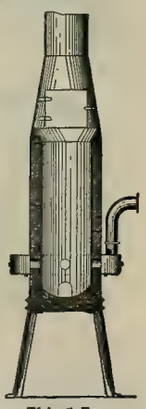

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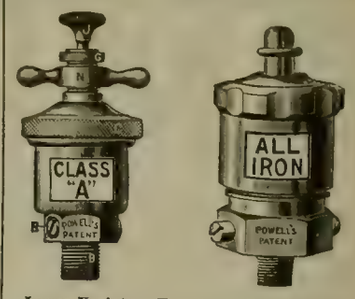

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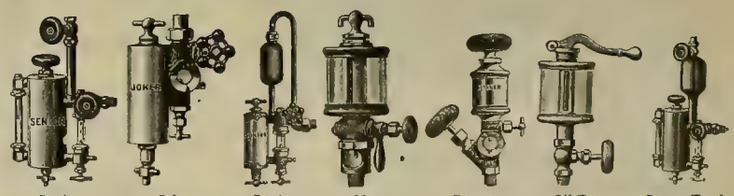

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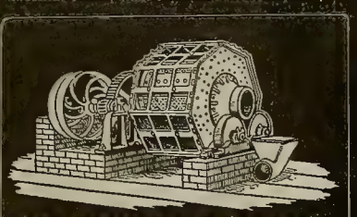

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ASSESSMENT NOTICES.

MOHICAN MINING AND MILLING COMPANY.—Location of principal place of business, San Francisco, California; location of works, Tuolumne County, California.

Notice is hereby given, that at a meeting of the Board of Directors, held on the 15th day of May, 1901, an assessment (No. 1) of ten (10) cents per share was levied upon the capital stock of the corporation, payable immediately in United States gold coin, to the secretary, at the office of the company, 300 California St., San Francisco, California.

Any stock upon which this assessment shall remain unpaid on the 15th day of July, 1901, will be delinquent, and advertised for sale at public auction; and unless payment is made before, will be sold on WEDNESDAY, the 14th day of August, 1901, to pay the delinquent assessment, together with the costs of advertising and expenses of sale.

By order of the Board of Directors.

JNO. W. CLASSEN, Secretary.

Office—300 California St., San Francisco, California.

YUBA CONSOLIDATED GOLD MINING COMPANY.—Location of principal place of business, San Francisco, California; location of works, Nevada County, California.

Notice is hereby given, that at a meeting of the Board of Directors, held on the 10th day of May, 1901, an assessment (No. 1) of one (1) cent per share was levied upon the capital stock of the corporation, payable immediately in United States gold coin to the secretary, at the office of the company, Room 801, Claus Spreckels Building, San Francisco, California.

Any stock upon which this assessment shall remain unpaid on the 25th day of June, 1901, will be delinquent and advertised for sale at public auction; and unless payment is made before, will be sold on MONDAY, the 15th day of July, 1901, to pay the delinquent assessment, together with the costs of advertising and expenses of sale.

By order of the Board of Directors.

EDWARD H. STEARNS, Secretary.

Office—Room 801, Claus Spreckels Building, San Francisco, California.

INYO MARBLE COMPANY OF CALIFORNIA.—Location of principal place of business, San Francisco, California; location of works, Inyo, Inyo County, California.

Notice is hereby given, that at a meeting of the Board of Directors, held on the 27th day of May, 1901, an assessment (No. 34) of five (5) cents per share was levied upon the capital stock of the corporation, payable immediately in United States gold coin, to the secretary, at the office of the company, room 31, tenth floor, Mills Building, San Francisco, California.

Any stock upon which this assessment shall remain unpaid on the 8th day of July, 1901, will be delinquent and advertised for sale at public auction; and unless payment is made before, will be sold on TUESDAY, the 6th day of August, 1901, to pay the delinquent assessment, together with the costs of advertising and expenses of sale.

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DELINQUENT SALE NOTICE.

OSCEOLA CONSOLIDATED MINING COMPANY.—Location of principal place of business, San Francisco, California; location of works, Plymouth, Amador County, California.

Notice.—There are delinquent upon the following described stock, on account of assessment (No. 11) levied on the 23d day of April, 1901, the several amounts set opposite the names of the respective shareholders, as follows:

Names.	No. Cert.	No. Shares.	Amt.
Pon Wand	51	250	$2 50
Pon Wand	55	250	2 50
Pon Wand	81	160	1 50
Pon Wand	87	500	5 00
Lu Chee	54	250	2 50
Jung Chee	57	250	2 50
George W. Warren	66	5,000	50 00

And in accordance with law, and an order from the Board of Directors, made on the 23d day of April, 1901, so many shares of each parcel of such stock as may be necessary, will be sold at public auction at the office of the company, 307 Montgomery street, San Francisco, California, on MONDAY, the 17th day of June, 1901, at the hour of 12 o'clock M. of said day, to pay said delinquent assessment thereon, together with costs of advertising and expenses of sale.

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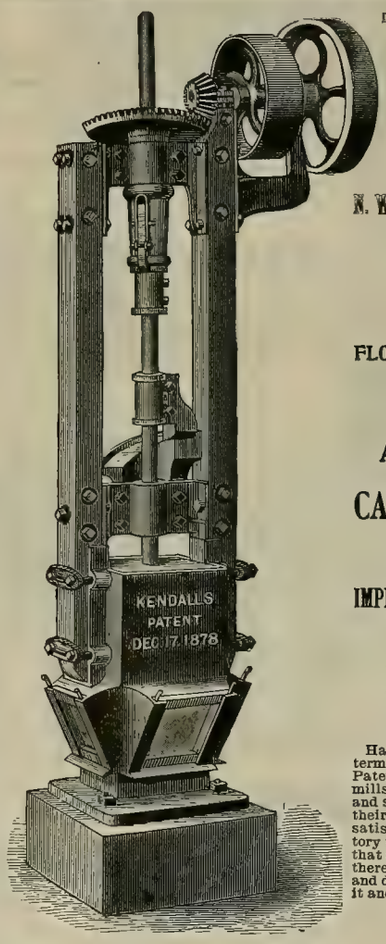

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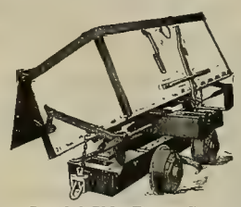

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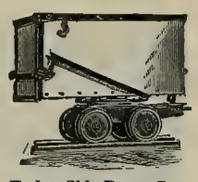

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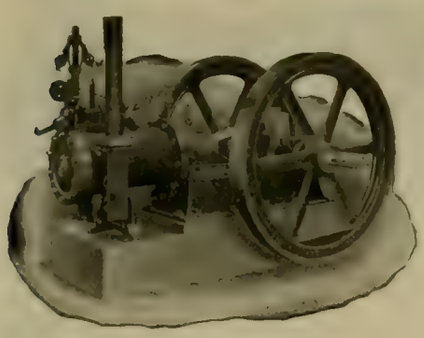

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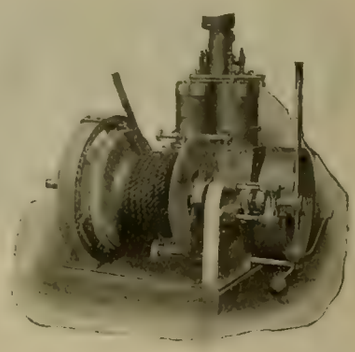

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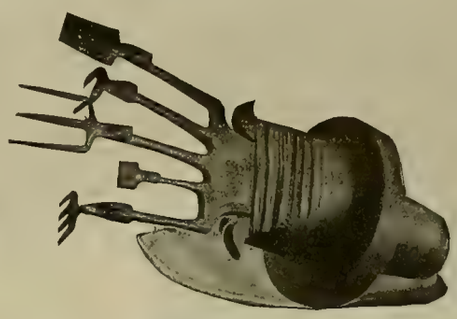

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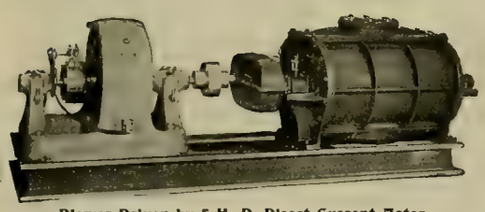

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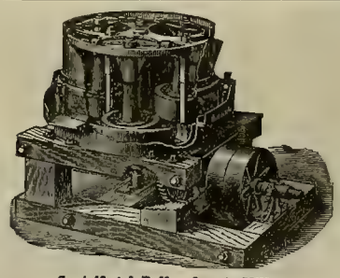

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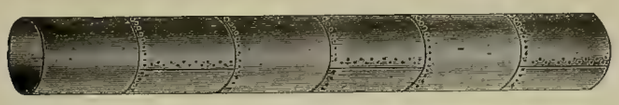

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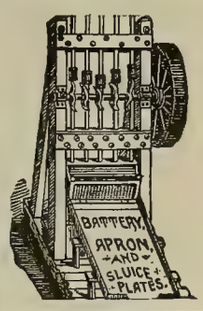

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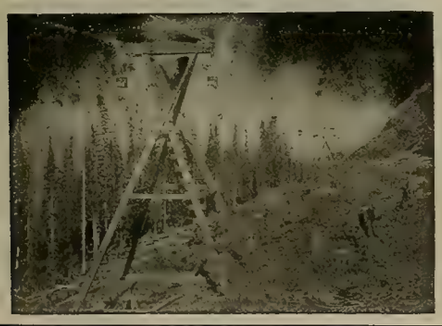

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An Old Mexican Stamp Mill.

With all the awakened mining activity of Mexico, and all the foreign advance of methods and appliances that it has received during the last twenty years, the country still presents instances of survivals of the "antigua" mining when Mexico lived within itself.

The illustrations on this page show one of the old stamp mills used for the crushing of gold and silver ores and the typical Mexican hacienda of Guadalupe y Calvo, where it is located.

It was erected over fifty years ago and is still running, whenever there is water enough to turn the great wheel, without a modification of the old picturesque construction. The belts are made of plaited strands of rawhide. Wooden pegs on the water wheel shaft act as cams and raise and drop the wooden-stemmed stamps. There are no screens to the battery—simply an overflow discharge. The mortar is made of wood. With the plant is a barrel for amalgamation, which can be seen next the water-wheel rim in the view of the mill building. This barrel is driven by means of a horizontal wooden wheel, having a number of short, vertical pegs, which interlock with other wooden pegs on the side rim of the water wheel.

The whole establishment is quite typical of the old Mexico, and it might be added of the old Mexicans. It is the production of a people to whom labor and time were capital, but whether work produced its end to-day or to-morrow mattered little, so long as it did in the end produce. The mill crushed slowly, but it crushed the ore and beat out the gold surely. It was enough for the Mexicans. Surely a machine construction which has withstood even Mexican wear and tear for a half century can not be called an uneconomical investment of the original capital.

Town of Guadalupe Y Calvo, Mexico.

The Rosario mines, operated by the modern methods and capital, are at Guadalupe y Calvo, in comparable proximity to this old mill plant. But the Mexicans stay with the old mill and will doubtless be using it when the modern operation, now new, has become a legend of Guadalupe y Calvo.

It is not generally known, but a similar mill was built by Mexican miners on a ledge at Forest Hill, Placer county, California, about thirty years ago. The ruins of it are still standing.

Two-Stamp Mill, Wood Instead of Metal, Guadalupe Y Calvo, Mexico.

Battery and Stamps; Wood Construction, Mexico.

MINING AND SCIENTIFIC PRESS.

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San Francisco, June 15, 1901.

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NEVADA STATE is at the present time attracting much attention as a field for mining investment. It is equally a good field for the prospector. Probably no other State has as large an area of unexplored country of mineral-bearing possibilities. The recent discoveries at Reno show how easy it is not to see a mine when handicapped with a conviction that there is no mine. Tonopah, which now has, it is said, a full half thousand of population, eight months ago was not even a name on the map, and had no population at all. On the eastern boundary the enterprising miners of Utah have been prospecting westward and finding promising mines all along the line between the two States. There is no reason why the same close prospecting that Idaho, Utah and Arizona are having should not produce equally substantial results when extended over Nevada.

FROM telegraphic reports it would appear that the Pennsylvania Railroad Co. has bought the Pennsylvania Steel Co. Aside from the individual magnitude of the transaction, if correctly reported, it is very suggestive. The largest customers of the large industrial combinations recently formed are other large industrial combinations. The principal customers of the steel manufacturing combination are the railroads. Evidently the action of the Pennsylvania Railroad Co. has been directed to secure to itself the profit of an economy that the steel manufacturing combination expected. The Pennsylvania Railroad proposes to manufacture its own rails and the steel for its bridges and buildings. The action exposes the weak place in the theory of gains to be made by combination. The customer may revert to original conditions and perform for himself the service the anticipated profit of which has been capitalized by the combination and sold—to foreign investors. Take the business of steel manufacture for example. It costs to make steel in the United States $12.50 a ton. The profit the steel is made to earn in the largest combination of the trade yet made is said to be about $18 a ton. That is, it is said that it must make this to pay the fixed interest and anticipated dividend charges. The average cost of transportation to the point of use within the United States of the manufactured steel is $10 per ton. The consumer thus is made to pay $12.50 a ton costs of manufacture of the steel and about $28 a ton waste. With a use for say 50,000 tons of steel a consumer can economize an aggregate waste of $1,400,000 by building his own steel manufacturing plant at the point he wants the steel. It is not intended to imply that the consumer can make steel for $12.50 a ton; but that the possible economy is large enough to pay a larger cost and build the plant.

The Mining Congress in July.

The Mining Congress at Boise, Mont., will have read before it some able and instructive papers on mineral resources and mining of several States and Territories. But, desirable and useful as these essays and literary documents will undoubtedly be in their special field, their presentation should not put in the background the real business for which the Congress has the right of existence. The essays can be printed. Indeed, if they are in matter what their titles call for, they must be printed in order that they shall receive the consideration which is their due after the Congress has adjourned.

The statement of the objects of the meeting of the Congress, as formulated in the call, is very general. It is too general to be worked down into identical, concrete detailed lines of proposed action by the scattered individual members before the date of meeting. Three days of meeting, with the interest of the members scattering in a whirl of social entertainment, in the consideration of essays, in the examination of mineral exhibits, and in the routine business of organization of the meeting and provision for its successor a year hence, will leave little time for that working down of glittering generalizations into detailed, definite policies.

Something more is wanted than resolutions. That something is results. To this paper the part of the Congress in the scheme of the mining industry of the nation—for it is national, rather than international, even though so named—is political. It should be the initiative and referendum of legislation relating to the mining industry. It should know what the industry as a whole wants in its relation to all the other industries of the nation. It should say what it wants clearly and with an emphasis that will command both attention and action. It should consider ways and means of getting what it says it wants. It should proceed to get what it says it wants by using the ways and the means, which in political matters are men and the combined power of their common business interests.

The mining industry very much wants what this paper proposed years ago—a Cabinet officer, a Secretary of Mines. It would seem as if the industrial changes of the last year had brought it within reach. When wheat, corn, cotton and cattle were the great export staples, the business interests producing, manufacturing and exchanging them were able to get a Secretary of Agriculture. Now iron, steel, copper and coal are fast becoming great export staples, and the strongest financial and commercial business interests of the nation are far more closely identified with the mining industry than they are with the agricultural. Mining is no longer a local business in the Territories and in a few States. A majority of the States are now interested in mines and in mining. The industry has vast wealth and many votes. The wealth and the votes should be able to command a Cabinet representative.

The mining industry wants badly a revision of the present general statutes and a codification into other statutes of the essence of many judicial declarations. While it wants all this, it can possibly best get some of it by formulating a few of the most necessary changes. It can ask the change of the law of location, so as to do away with extralateral rights. It can propose a change in the issuance of patents to public lands, so that the minerals beneath the surface shall remain open to exploitation independent of the patent to the surface for other purposes. This is the Mexican law and it works exceedingly well in practice there. In operation in this country, such questions of title as have come up at Leadville, Colo., cannot arise. The getting of patents will be simplified and the existing premium for successful dishonesty in patenting land will be removed. The mining industry in Alaska wants the abolition of the special legislation, the vicious operation of which has resulted so injuriously to its development. The mining industry wants none of the same kind in the Philippines.

What has been here suggested is constructive legislation. Not alone will its enactment be advantageous to the mining industry, but it is in the line of an enlightened public policy. It is the lesson of the successful industrial reorganization of a part applied to the whole. Just as industrial reorganization has been predicated on the elimination of wastes and the inauguration of enlightened economies, so will what is here suggested, when accomplished, eliminate wastes and promote enlightened economies. It will eliminate the waste of litigation over extralateral rights, for there will be none to litigate over. It will eliminate the waste of legal procedure in getting titles, necessitated to prevent fraud, by removing the incentive to its commission. It will make an enlightened economy by eliminating some of the parasitic public officials who now lawfully mine the miner's pocket.

These suggestions of potential possibilities in results from the Mining Congress are made in the hope that they may receive the consideration of members in advance of the meeting, and with the wish that they should receive from the press the thoughtful discussion that their importance merits.

Then, when the Congress meets, the members should waive the opportunity to do little businesses with each other and concentrate on the big business for the gain of all. The United States is going now into a world-dominating contest for the control of the markets for metals just as it has already successfully gone for the control of the food supplies. Let the members of the Mining Congress so act as to clear the field of action of what are clearly nothing but hindrances to success. The place for the mineral specimen exhibits is Buffalo. The place for the essays and literary documents is in books. The brass bands and bouquets of resolutions are for celebrations. The Congress is simply a machine to get concrete results in political legislative actions which will make more profit to all engaged in the industry without taking it from each other.

A COMPLETE CENSUS OF ALASKA at this time would show a white population of citizens of the States and the United States of not less than 30,000. This population may fairly be considered permanent. The natural resources and establishment of industrial occupation have brought the people of the country into business and social relations in no ways markedly different from the business and social relations of the communities from which they came. While there are excuses to answer for the different governmental relation of the Alaska people when the population was small and transient, there is no reason for the existence of the difference now, and there should be no excuse. Alaska people should not be subject to unnecessary official or indirect governmental spoliation. Not ruling themselves, and without officials directly responsible to them, this is bound to continue. Most of it is petty in character, consisting of fees and charges paid officials for which they do not have to account, and in the maintenance of public offices at points not convenient to established centers of population and routes of travel. Congress in making legislation to protect creditors in Alaska provided that statements of individuals or companies doing business in Alaska must be filed annually with the Secretary of the District and with the clerk of the District Court. It did not provide any filing fee. The Secretary of Alaska has thereupon established a filing fee of $10, which he collects as a personal perquisite. The service of filing does not cost any labor but indexing, and not necessarily even that. The fees for recording mining locations and other papers are fixed in sums double and more than the service costs. The Government maintains the office of the Surveyor General at Sitka, necessitating not less than $100 of indirect cost to every mine patent application, which could be avoided by locating the office at Juneau. The cost of moving the office to Juneau is a trifle compared to the public convenience and economy effected. Congress should do it. The Territory should have an additional measure of self-government sufficient to enable it to protect itself from the petty fee exactions of officials. All of these bear proportionally harder on the prospecting mining than on any producing industry. They are a tax on capital which the capital is not earning and may never earn.

THE recent order for the conversion of all of the Southern Pacific engines into oil burners will, when completed, consume annually a quantity of petroleum equal to the present entire annual production of California. The present low sale price of oil should not stop the drilling of new wells. The market will be able to consume the product.

Concentrates.

STEEL is divided into four general classes—converted or cemented steel, crucible cast steel, Bessemer (acid or basic) cast steel and open hearth steel.

THE petroleum-bearing rocks in Colorado are sandstones and shales of Mesozoic age, and principally of the upper division of it, the Cretaceous period.

ALL plan drawings should have marked on them all the dimensions that are necessary for the use of the plan. It should not be necessary to scale the plan to ascertain them.

THE U. S. Supreme Court has ruled that the clause of the Constitution providing that private property may not be taken without just compensation means that compensation in money must be rendered.

TO DRILL a chilled casting, heat the casting and put a little sulphur on the spot it is desired to drill and permit it to cool. Harden the drill and draw no temper, using equal quantities of alcohol and turpentine.

A RECENT INVENTION is a process by which paper is worked into thread by spinning and into many fabrics by weaving. Another novel manufacture is an ax made of paper with a hard, fine edge that stands use in cutting.

NOTES kept on resurfacing a macadam road that was considerably worn, the material being a hard limestone, showed a cost of 3.3 cents per square yard. At this rate for a 16-foot roadway the cost would be about $300 a mile.

A SUCCESSFUL CONTRACT BID of 20 cents a cubic yard for dredging for the United States Government is inconsistent with an actual payment of 12 cents a cubic yard for dredging in the same ground for a private corporation.

THE thickness of the tinfoil in common use runs upward from a minimum of a half thousandth of 1 inch. It is made by rolling instead of beating. It is not necessarily pure tin, but is usually a center layer of lead covered with the tin, the two metals being first welded together.

THE cost of mountain road construction, side-hill grades in a timbered and rock country, varies from $600 to $2000 a mile, dependent on the hardness of the rock and the steepness of the slope. The lower figure is for shelly slate rock that can be picked on hill slopes from 5° to 20°.

THE Canadian Minister of the Interior has finally confirmed the title to the locators of locations made on Dominion creek, in the Klondike, before the reservation of alternate claims was made for the Crown. The ground of the decision was the priority of the locations to the date of the reservation.

NAILS AND TACKS are now made from an aluminum alloy that does not corrode or deteriorate in the atmosphere. They are desirable as a substitute for copper nails and tacks on roofs and tank fastenings. Taking difference of weight into account, they are about 4 cents a pound cheaper than copper nails and tacks.

IN the Cowper-Coles process for aluminum welding no solder is used and the process is not electrical. It is claimed that cast aluminum welded by this process is tougher and stronger at the weld than elsewhere. The apparatus used is stated to be simple and applicable to any section of metal, and the weld is made without hammering.

RECORDS kept of the work done by compressed air tools in twenty classes of work of a large railroad machine shop, and comparisons made with the records of similar work done by the old-style hand labor show that the use of the compressed air tools effected an average saving in the cost of the work of 70% and in the time employed of 72%.

A CERTAIN amount of roughness in the surface of steel, such as is left after cleaning by a sand blast, is desirable where the steel is to be painted. There is practically no absorption of paint into the body of the steel, so that the adhesion is wholly restricted to the surface. The irregularities of the rough surface provide a better adhesion than a perfectly smooth surface would.

A CAST STONE CONSTRUCTION for buildings has been introduced and applied at Baldwin, Michigan, on a group of manufacturing buildings covering seventeen acres. The walls have inside and outside sheathing of "cast-stone" blocks, with interlocking joints, so formed as to be solidly united with the concrete monolith deposited to form the base of the walls. The blocks are hollow, closely imitate stone and can be made damp-proof and frost-proof.

IN Washoe county, Nevada, since 1876, there have been made and recorded 7327 mining locations. A very large but unknown number represent relocations. By far the greater number were locations of gold and silver claims. Of the remainder 213 are for borax claims, 79 for copper, 37 for coal, 13 for quicksilver, 13 for gypsum and 2 for antimony. Peavine district is credited with 1697, Washoe 1510, Pyramid 931, White House 736, Wedekind or Bryan City 200. The remainder in smaller numbers are scattered in many minor districts.

BLUE PRINTS AND PAPER DRAWINGS generally can be waterproofed by the use of refined paraffine. Saturate in melted paraffine pieces of absorbent cloth and cool. These can be used at any time subsequently. Spread a piece of the cloth on a smooth surface, superimpose on it the blue print drawing, and on top of this a second sheet of the cloth. Iron with a moderately hot iron. The paper will absorb paraffine from the cloths till saturated, more paraffine being put under the iron till thus effected. By the process the lines in the drawing are brought out and intensified. The paper is not shrunk or distorted and becomes translucent and waterproof.

THE principal industrial use of black oxide of manganese is in the manufacture of ferro-manganese for subsequent use in steel making. Some small amount is employed in chemical manufacture. The Illinois Steel Co. at Chicago are buyers of manganese ores from Leadville, Colo., and the Carnegie Co., at Pittsburg, Pa., are even larger buyers, principally of ore from foreign mines. The price is low, as it is not a rare mineral. It is sold by units, and, if of the best grade and free from phosphorus, brings from $12 to $15 a ton at the point of delivery.

IN brazing, the two parts to be joined are beveled so that where the joint is made there is no increase of thickness of metal. Cleaning is completed by acid, a piece of solder is placed between the parts, and heat applied to fuse the solder quickly and at the same time fuse the faces to be joined so that there is an entry of the solder into the body of the metal. Cooling should not be too rapid, as the joining would thus become hard and brittle and fail to stand the wear of use. On the other hand, if cooled too slowly the joint would have a soft spot and be liable to give out from that cause.

A TUNNEL location is limited to unappropriated public land in the right of appropriation of blind ledges discovered by it. That is to say, if there are prior valid lode locations in the line of the tunnel, any blind ledges apexing within the vertical planes of their side or end lines are part of the claim location and cannot be acquired under a tunnel location even if the actual discovery is made in the latter outside of those vertical planes. The tunnel cannot under the United States statutes cross the planes of the boundary lines of the location in search of ledges, though it has the right to follow and mine within the vertical planes, ledges discovered and apexing without those planes.

WASTE and economy in the business of mining depends on the point of interest of the individual. Broadly stated waste is any value out of the mine that other individuals get, and economy consists in keeping the values of the mine that other individuals get down to the smallest unavoidable amount. Wastes are of two kinds, unavoidable and avoidable. Unavoidable wastes are bare costs of necessary labor and service. Avoidable wastes are the profits of other individuals than the one who occupies the point of individual interest. Economy consists in preventing avoidable wastes by keeping other individuals from getting profits. From the point of view of the mine operator, the individual who carries the initial and greater risk of the business, the profits the custom smelter or millman, the railroads, and the selling agents make out of the values taken from his mine, are wastes. Economy from his point of interest consists in getting these profits himself—which he can do by himself performing their services. From the point of view of the smelter man and the railroad transporter and the selling agent in combination, waste is the profit the miner makes. Economy is taking it away from him and dividing it among themselves. If the three are not combined, business consists in getting the largest share of the profits of the mine.

THERE will be no regular programme prepared for the meeting of the International Mining Congress at Boise in July except for the first day. The congress itself will prepare the programme for the susequent days. The following will be present and by special invitation will present papers on the subjects named: Hon. J. Hutchinson, Silver City, "Mining in Idaho;" Prof. S. W. McCalla, Atlanta, Ga., "Mineral Resources of Georgia;" Prof. N. H. Winchell, Minnesota, "Geology of Minnesota;" Mr. E. Sloan, South Carolina, "Geology of South Carolina;" Prof. E. A. Babcock, North Dakota, "Geology and Mineralogy in an Educational System;" Dr. J. Talmage, Salt Lake City, "Geology of Utah;" Mrs. Mary Arkwright Hutton, Wallace, Idaho, "Some of the Ethical Aspects of Mining;" Prof. Samuel Calvin, Iowa, "Geology of Iowa;" Prof. J. A. Holmes, North Carolina, "Geology of North Carolina;" Prof. J. C. Smock, New Jersey, "Geology of New Jersey;" Prof. E. W. Hall, Minnesota, "Iron Zone of Minnesota;" F. C. Semmic, Duluth, "Mining as a Business Compared With Commercial and Manufacturing Enterprises;" Dr. G. D. Louderback, Nevada, "Geology of Nevada;" Hon. A. P. Swineford, Alaska, "Alaska — Its Climate, Resources, Etc.;" Hon. W. B. Heyburn, Idaho, "Revision of Our Mining Laws."

IF the railroad land is patented, the title is good for any mines there may be on the land. Such a patent can not be questioned, except for fraud in obtaining it. Only the Attorney-General of the United States can bring an action to cancel a patent based on fraud. The patent itself is presumptive evidence that there has been no fraud. On patented railroad grant land there may be mines, but there cannot be mining claims, as they are defined by the Revised Statutes of the United States. The mining claim is, strictly speaking, a grant of right to possession of and use of a tract of unpatented public land under compliance with certain conditions, one of which is assessment work. On patented land the mining claim ceases to exist as such, and with its termination of existence goes the necessity of compliance with the conditions provided for the possession and use of mining claims. Assessment work is not required on mines on patented land, no matter what kind of a land patent it is. If well known mineral land is in sections designated as a railroad grant, at the time of the vesting of the title of the grant, the well-known mineral land is excluded from the grant and never in fact becomes part of it. On such land assessment work must be done on mining claims. If the land was not well known mineral land at the time of the vesting of the grant, but subsequently becomes well known mineral land before what is known as "listing" for issuance of patent to the railroad, the land may, or may not, revert to the public land and become open to the location of mineral claims. It depends on the construction the courts have given to the particular grant. Generally, mining claims are located, and on such development work must be done until patent issues.

THE committee of the American Society of Mechanical Engineers who have been considering the codification and standardization of the methods of making engine tests have in their preliminary report recommended the number of heat units consumed per hour per indicated horse power and per brake horse power as the standards of comparison. This is not intended to do away entirely with the common existing terms of expressing comparative efficiency of energies, which are recognized as useful within their limitations, but to have a common final standard test based on the actual thing all engine operation depends on, heat. The heat consumption of a steam engine required for the standard test is ascertained by measuring the quantity of steam consumed calculating the total heat of evaporation of the entire quantity, and crediting this total with that portion of the heat rejected by the engine, which is utilized and returned to the boiler. The term "engine" as here used shall include the entire equipment which is concerned in the production of the power, embracing the main cylinder or cylinders, the jackets and reheaters, the air, circulating and boiler feed pumps, if steam driven, and any steam driven mechanism necessary to the working of the engine. The heat consumption of gas, oil or other engines of the internal combustion class is found by ascertaining the total heat of combustion of the particular fuel used, which should be determined by a calorimeter test, and multiplying the result by the quantity of fuel consumed. The I. H. P. for the proposed standard is obtained by the use of steam engine indicators. It should be confined to the power developed in the main cylinder or cylinders, and should not include that developed in the cylinders of auxiliaries. The committee have recommended as a subsidiary form the basing of efficiency on a "standard coal" unit, which is a coal giving to the steam 10,000 British thermal units for each pound of dry coal consumed.

PLACER GOLD is not, as a general rule, found very distant from its original place of lode or rock deposit. The hardness of the lode rock, fineness of the particles of gold, and the relative hardness of the lode-enclosing rocks compared with the country rock down stream are conditions which exert more or less influence on the distance of the deposit from its source in the rocks in place. Very fine particles of gold will float, particularly if in thin scale; also such rock fragments as contain fine particles of gold will be moved farther from the place from which broken out from a lode than pieces of rock containing coarse gold. Gold in honeycombed quartz or oxidized iron-bearing quartz is very generally freed from the quartz before being moved far from its original place; as a matter of fact, much of it is completely broken up, freeing the gold in place, to accumulate and form a pocket right on top of the large outcrop or immediately below it. The soft country rocks, by wearing down under erosion more rapidly than the relatively harder rock, by limitation up and down stream, are evidenced by successive parallel cutting, and, in the comparatively broad level stretches thus formed, furnish places for long-continued deposit of gold-containing rocks, which there become broken up and deposit their content of gold when they themselves in smaller fragments are pushed onward down stream. In the harder rocks the cutting is continuous in practically one line, so that no places of accumulation of gold-containing rocks are made, and there are comparatively small accumulations. In the California mountains the streams cut through successive bands of gold-containing rocks, so that distribution of deposits of placer gold were formed over long-continuous channel distances, as compared with many other districts. Normally, 5 miles from the upper limit or lode source to the lower limit beyond which there is gold, but insufficient in quantity to be payable, is about the limit. Above the lode source there is, of course, nothing. Below the workable placer there is a long down-stream distance in which there is gold, widely distributed in traces that are apt to be misleading. These fine colors and general prospects are due to the widely distributed fine gold that is more or less floatable either by itself or as fine particles in fragments of lode rocks. These particles are, if anything, more likely to be plentiful near the top of a deposit, rather than at the bedrock or bottom. The value of the bedrock deposit cannot be correctly estimated from this light gold of the top wash. It is only safe to estimate from prospecting of the entire depth. Generally a gradation downward of the size of the particles can be observed beginning at the lode source. Coarse gold is very generally found close to the original lode source, very fine light gold at a considerable distance from it. Generalizations as to probable quantity in a deposit are unsafe without considerable prospecting covering a comparatively large area.

Leadville Pumping Practice.

Written for the MINING AND SCIENTIFIC PRESS by A. W. WARWICK.

One of the most salient features of the Leadville district, from the miner's point of view, is the large volume of water to be handled. Not only are the mining operations made more expensive on this account, but it causes prospecting to be more difficult and hazardous. So far as prospecting is concerned, it must be remembered that the Leadville deposits are "blind" and that it is necessary to sink for 500 to 1000 feet to reach the probable ore contacts. During the sinking operations immense flows of water may be encountered and progress will be slow and expensive; finally all this expense may be in vain inasmuch as the "contact" may be barren or even nonexistent in the territory controlled by the prospectors. Any one experienced in sinking wet shafts will readily understand why, under these circumstances, such sums as $50,000 to $100,000 have to be expended in doing mere development work.

In the entire Leadville district 15,000,000 gallons of water are pumped per twenty-four hours, or 63,000 tons. The amount of ore raised is about 2200 tons per twenty-four hours; the ratio of water to ore raised is therefore 28½ to 1. From a careful estimate of the average cost of pumping it seems that it costs 4 cents per ton to raise water or a charge of $1.14 against every ton of ore mined. The production of the camp was 818,000 tons for the year 1900; the pumping charge, therefore, against the production was $932,000. The value of the camp's product for the same period was estimated at $12,900,000, so that practically 7¼% of the production went to pay pumping expenses.

It will be understood that these charges include both productive and unproductive mines. In the best equipped producing and pumping mines the cost of pumping will vary from 30 cents to 75 cents per ton of ore raised, varying according to volume of water handled, depth of mine and output of ore.

It will be readily understood from these facts why the water question in Leadville is such a serious one and why "bucking water"—to use the elegant local phrase—looms so large in the reports of prospecting companies. The problem is such a serious one that a great deal of attention has to be given to it, in order to keep the expenses down to a reasonable limit. It can hardly be doubted, therefore, that under these conditions many interesting facts can be obtained from a study of the pumping practice of Leadville. Moreover the camp has been worked for over twenty-two years so that a definite practice has been evolved from the failures and successes of the past.

One feature of mining in Leadville, however, has to be given full weight in considering the mining methods, and that is the conditions of tenure of property. With few exceptions the Leadville mines are worked by lessees and sub-lessees, some of whom are working miners, others syndicates or leasing companies. Until recently leases were short and the operation of the mines was governed entirely by the life of the lease and not of the mine. Leases are now granted for long terms, ten years in some cases, and a decided improvement in the mining methods is the result.

Another feature must be considered. So far as at present known the maximum depth, at which these mines are to be worked, is 1400 feet and in the great majority of cases 1000 feet is the working limit. Under these circumstances enormous surface equipments are not required in Leadville; however, owing to the large volume of water to be handled, very large pumps must be used.

In the last few years some very fine pumping machinery has been installed in the district; they are all of the direct-acting type with outside packed plungers. All the best known makers are represented. Sinkers are generally of the Cameron, Snow or Knowles make. Station pumps are compound or triple expansion condensing of the Jeanesville, Knowles, Worthington, Prescott, etc., make. No electric, Cornish or rotative pumps are in use. Nor are any of the pumps operated by compressed air.

All working mines are well equipped with pumps: A typical outfit consisting of from three to five sinking pumps of a capacity of 300 gallons each against a maximum lift of 600 feet; two or more station pumps, one of which is capable of handling the normal flow and the others acting as reserves in case of breakdowns or sudden rushes of water.

SINKING PUMPS.—The Cameron and Snow sinkers appear to be the favorite pumps of this class. Slip joints are used in both steam and water columns and are of sufficient length to allow of the insertion of a full length of pipe between pump and columns. Whilst unwatering an old mine or sinking a wet shaft the sinkers are frequently run far above the rated capacity. The severe shocks and grit try the quality of the very best pumps so that frequent breakdowns occur. The number of sinkers used is such that one or more, in a perfect state of repair, may always be in reserve. Where the water flow is heavy and the depth great it is usually found necessary to relieve the sinkers by cutting temporary stations for tank and station pump; this principle may be extended far more than is customary, as it will be found cheaper and more rapid in the long run.

The steam economy of the sinking pump is exceedingly bad; few pumps of this class use less than 100 pounds steam per pump H. P. and most use 150 pounds. Extreme cases have been noted in which 200 pounds steam are consumed per pump H. P. It will be obvious, therefore, that the work of the sinker should be relieved as much as possible by the use of the station pump, which consumes in extreme cases not more than 50 pounds steam per pump H. P.

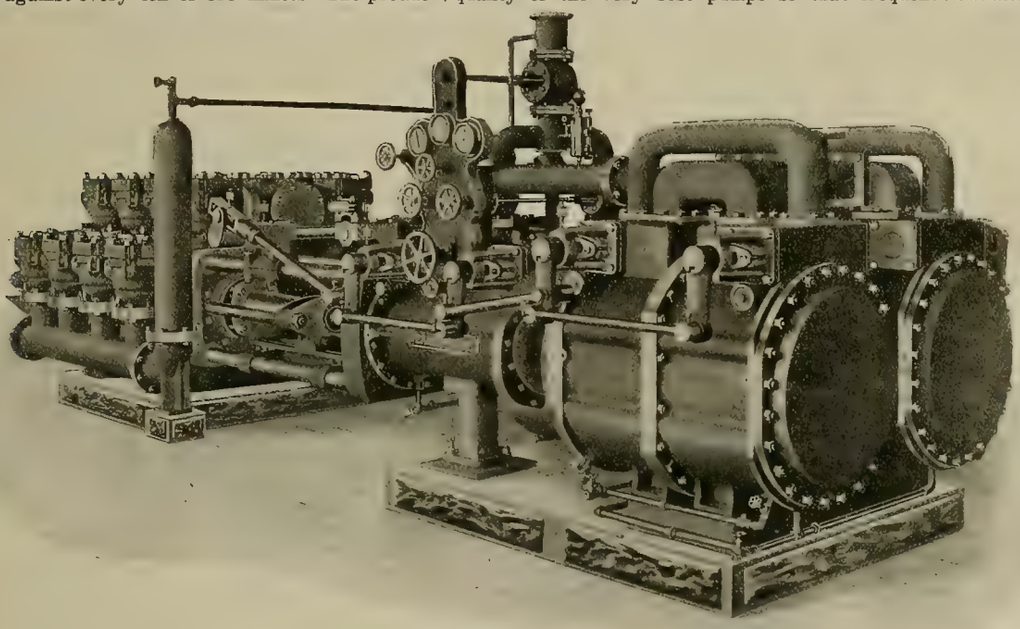
The sinking pumps are designed for the extreme maximum lift, in which case the steam piston receives the full pressure of the boiler; less, of course, the reduction due to friction of steam pipe and condensation. When the pump is working at shorter lifts the steam supply must be regulated by the throttle. For these reasons the compound sinking pump has not been a success except in very special cases, such as relieving the ordinary sinkers at depths approaching the maximum.

It is generally claimed that the practice of exhausting the steam into the suction pipe originated in this district. There is no question but that this practice increases the efficiency of the sinker by decreasing the back pressure on the steam piston, and keeps the shaft cooler and free from disagreeable clouds of steam.

In figuring the boiler capacity required for sinking pumps, a convenient rule is to figure the pump horse power and multiply by four, to find the boiler power. Thus, handling 800 gallons water per minute from a depth of 400 feet, the pump horse power is 80, approximately. If handling this flow by sinkers alone, 320 boiler H. P. will be required, or, say, three 125 H. P. boilers. This accounts for the large number of boilers seen at the Leadville mines, half of which may not be in use; they have, however, either been in use operating sinkers, or it is anticipated that a sudden rush of water may necessitate their use at any time. In "bucking water" it is not merely a question of pump capacity, but also boiler capacity. The typical sinker has 14-inch steam cylinder, 13-inch stroke, 7-inch plunger, 2½-inch steam pipe and 5-inch suction, and makes normally 100 strokes per minute.

MAIN OR STATION PUMPS.—All main pumps are of the direct-acting, reciprocating type, driven by steam. The Cornish type is quite obsolete, and from the wrecks of such pumps that may be seen scattered over the hills it is certain that their design and construction was crude in the extreme. This accounts, no doubt, for the total disappearance of the Cornish pump from actual operation. Still, the direct-acting pump is so well adapted to handle variable flows of water, its capacity can be so readily increased, its efficiency is so high, the maintenance and repair charges are so small, the room taken up in the shaft is small, and, above all, the interest on first cost and the depreciation is much less than when using the Cornish pump, that it is practically certain that the Cornish pump has disappeared forever in the West.

The Leadville station pumps are invariably of the condensing type, thus not only taking care of the exhaust steam, but also increasing the steam economy. The steam end is generally compounded, but most of the large pumps recently installed are triple expansion. The boiler pressure usually carried—eighty pounds—is not adapted to triple-expansion engines. The Wolftone triple expansion uses steam at 140 pounds boiler pressure. The steam cylinders of most pumps are steam jacketed. It is worthy of remark that no rotative pumps, such as the Riedler or Dickson, have been tried in Leadville, nor are there any electric or hydraulic pumps. No pumps are actuated by compressed air. Practically speaking, the Leadville pumping practice is quite uniform throughout the district. This remark may be applied to all the Leadville mining operations: the uniformity is remarkable and in sharp contrast to other districts.



Jeanesville Station Pump, Leadville, Colorado, Mines.

The pumps are installed in well-timbered stations, which are usually of fair size. Many stations are, however, far too small; but the tendency is to cut them of larger floor dimensions, so that ample room is available when making repairs. Such repairs, as a rule, have to be made quickly, and the desirability of having plenty of room is obvious. The Penrose shaft has a station which is a model in this respect. The stations are not equipped with overhead crawls for handling heavy pieces, as in the Montana pump stations and in the stamp mill. The station tanks, or sumps, are usually of great size, and whenever the stations are at the bottom of the shaft it is customary to increase the holding capacity by driving levels. In addition to this, at the Ibex, the pump station is raised 6 or 8 feet above the floor of the drifts. Many stations are lit with electric light; many by evil-smelling lamps. Some talk is being made of lighting with acetylene gas, which is admirably adapted to such work, being cheaper than oil and giving much better illumination than electric light. It is also very cheaply put in; a plant for one station should not cost more than $50 to $60 complete. The lesson does not yet seem to have been thoroughly learned that to keep machinery in anything like first-class shape plenty of light is essential. Few pumps have float attachments between sump and throttle so that the pump speed may be automatically controlled by the amount of water flowing into the sump.

The stations are cut usually on the narrow end of the shaft, so as to interfere as little as possible with the movement of ore and waste. The timbers usually put in are 14"x14" or 16"x16", the roof being supplied in most cases by long caps. The Ibex and Greenback stations, however, have arched roofs, which is certainly better construction. The following details have been compiled of the characteristic large duplex station pumps, average lift 1000 feet:

MINE.	Steam cyl's, inches	Stroke, inches	Plunger, inches	Steam pipe, inches	Water column, inches	Maker	Size of station, feet
Ibex	15 & 28	38	7½	6	13	Jeanesville	18 x 20x10½
Wolftone	18, 28 & 42	36	10	6	10	Knowles	16½x48x10½
Greenback	15, 23 & 39	24	9¼	6	10	Prescott	.....
Rialto	19 & 36	36	9	6	10	Jeanesville	16 x65x13

The steam pipes leading down the shaft are thoroughly well protected. The Ibex steam pipe is about 3000 feet in length from boilers to pump. The out-

side pipe is covered with 1 inch magnesia covering, then boxed and filled in with sawdust, making a very good protection. The pipe going down the shaft is protected with ⅛-inch asbestos paper, ½-inch felt and two wraps paper. This is then completely armored with galvanized iron pipe, each joint being soldered. This protection keeps the felt quite dry, thus assisting in preventing radiation. The radiation loss is not at all excessive.

Every pump is provided with a counter to record the number of strokes made. The condensers are invariably jet condensers. A vacuum of 18½ inches is held at the Wolftone pump, which has an elevation of about 9700 feet above sea level; the theoretical vacuum is 20½ inches.

At station pumps the pump men work twelve hours and receive $4; at sinkers the pump men work eight hours and receive $4 per shift.

The New Edison Storage Battery.*

It is well known that the history of the storage cell is essentially that of the lead cell discovered by Plante in 1860, in which lead peroxide is the depolarizing substance. An enormous amount of labor has, in the aggregate, been expended upon the improvement of this cell in the hands of experimentalists. As a result of that labor, the storage battery has at last become a recognized adjunct to the direct-current central stations, but it has limitations that seem to withstand further attempts toward improvement. Of recent years, hardly any success has been met with in the direction of reducing its weight for a given energy storage capacity, without detriment to endurance, and this weight is the great drawback of the storage battery in electric storage traction, and has been the principal obstacle to its advance in this direction for the past twenty years.

In practice, the storage energy per unit mass of the modern lead battery is from four to six watt-hours per pound of battery (8.8 to 13.23 watt hours per kilogramme). Expressed in another way, a battery weighs 124.5 to 186.5 pounds per H. P. hour at its terminals (75.5 to 113.4 kilos per kilowatt hour); or, if its stored energy available at terminals were all expended in gravitational work, a battery could raise its own weight through a vertical distance of from 2 to 3 miles (3.2 to 4.8 kilometers).

While it is possible to increase the energy per unit mass by making the electrodes very light, yet this is always found to be followed by a very heavy deterioration.

Many attempts have also been made to perfect storage cells of the alkaline-zincate type, but the great difficulty of depositing zinc in coherent form from the solution, as well as the lack of a depolarizer that shall be insoluble in the electrolyte, has stood in the way of this cell's success.

Mr. Edison set himself the task of finding a cell which should possess the following advantages:

1. Absence of deterioration by work.
2. Large storage capacity per unit of mass.
3. Capability of being rapidly charged and discharged.
4. Capability of withstanding careless treatment.
5. Inexpensiveness.

He believes that the cell here described may claim these advantages in a very satisfactory degree.

The negative pole or positive element, corresponding to the zinc of a primary cell or the spongy lead of a secondary cell, is iron. The positive pole or negative element, corresponding to the carbon of a primary cell or lead peroxide of a secondary cell, is a superoxide of nickel believed to have the formula NiO_2. The cell is therefore a nickel-iron cell, a name which suggests the structural material—nickel-steel. The electrolyte is potash; viz., an aqueous solution containing from 10% to 40% by weight, but preferably 20% of potassium hydroxide, the freezing temperature of which is 20° below zero Fahrenheit—or 30° centigrade.

The initial voltage of discharge after recent charge is 1.5 volts. The mean voltage of full discharge is approximately 1.1 volts. The normal discharging current rate per unit area of active element (positive or negative) is 60 $\frac{\text{milliamperes}}{\text{sq. inch}}$, or 8.64 $\frac{\text{amperes}}{\text{sq. foot}}$, or 0.93 $\frac{\text{amperes}}{\text{sq. decimeter}}$. The storage capacity of the cell per unit of total mass of the cell is 14 watt hours per pound or 30.85 watt hours per kilo. Expressing the same statement in another way, the weight of battery per unit of electric energy at terminals is 53.3 pounds per electrical H. P. hour or 32.4 kilos per kilowatt hour. Or the battery gives energy at its terminals sufficient to lift its own weight through a vertical distance of approximately 7 miles or 11.26 kilometers. The mean normal discharging power rate per unit mass of total cell is 4 watts per pound or 8.82 watts per kilo: corresponding to a normal discharge period of three and one-half hours. The cell may, however, be discharged at a relatively high rate, in approximately one hour: corresponding to a discharging power rate per unit of total cell mass of 12 watts per pound or 24.46 watts per kilo. Charging and discharging rates are alike. That is to say, the cell may be charged at the normal rate in three and one-half hours; or, it may be charged at a relatively high rate in one hour, with no apparent detriment beyond a somewhat lowered electrical charge efficiency. In other words, the cell does not appear to be injured by over-charging or discharging, and only suffers in electrical efficiency under such treatment.

The positive and negative plates are mechanically alike, and can scarcely be distinguished by the eye. They differ only in the chemical contents of their pockets. Each plate is formed of a comparatively thin sheet of steel, 0.024 inch (0.61 mm.) in thickness, out of which rectangular holes are stamped, so as to leave a grid or frame somewhat resembling a window frame. In one style of plate there are three rows of eight such rectangular holes or recesses, or twenty-four recesses in all.

Each opening or recess is filled with a pocket or shallow box containing the active material. These boxes correspond to the panes of glass in the window frame analogy. The panes instead of being thinner than the frame, as in an actual window, are thicker than the frame, or project slightly beyond the surface of the steel grid. They are perforated with numerous small holes to admit the electrolyte, but entirely conceal the contained active material from view. All that meets the eye, therefore, in any of the plates, is the steel frame, and its embedded "windows" of perforated steel.

The active material is made in the form of rectangular cakes or briquettes, and one such briquette is lodged in each pocket or "window pane" of the plate. Each of the twenty-four recess plates, therefore, supports, or contains, twenty-four briquettes of active material, all in rigid contact with its own substance.

Each briquette is placed in a shallow, closely fitting nickel-plated box of thin perforated crucible steel, cut from a long strip of that material 0.003 inch (0.075 mm.) thick. A cover or lid of the same material is then laid over it, so that the briquette is closely enveloped by the sides and walls of its perforated steel box. The boxes are then placed in the openings or holes in the nickel-plated steel grid, and closely fit the same. The assembled plate is then placed in a hydraulic press, and subjected to a total pressure of about 100 tons. This pressure not only tightly closes the boxes, but it also forces their metal sides over the adjacent sides of the recesses of the steel grid, thus clamping the whole mass into a single solid and rigid steel plate with the hollow "window panes" full of active material. The nickel plating of both grids and boxes aids in securing good permanent electric connections between them. The finished plate has a grid thickness of 0.024 inch (0.56 mm.), and a "window" or pocket thickness of 0.1 inch (2.5 mm.). This is the maximum thickness of the plate at any point, but being of steel, the plate has ample rigidity.

The positive briquettes (zincs of a primary cell) are made by mixing a finely divided compound of iron obtained by a special chemical process with a nearly equal volume of thin flakes of graphite. The graphite does not enter into any of the chemical actions, but assists the conductivity of the briquettes. The graphite is divided into very thin laminæ by a chemical process, and these are passed through sieves or screens so as to leave a size or area of flake that is much larger than the area of the perforation in the steel windows. The mixture is then pressed into briquettes in a mould, under a hydraulic pressure of about two tons per square inch. The briquettes have a surface area of nearly 3 inches by ½ inch on each face.

The negative briquette (carbon of a primary cell) is made by similarly mixing a finely divided compound of nickel, obtained by special chemical means, with a nearly equal bulk of fine flakes of graphite and solidifying the mixture in a mould into briquettes of the same size as above.

A suitable number of positive and negative plates are assembled together, being separated from one another only by a thin sheet of perforated hard rubber.

The assembled plates are placed in a vessel or external containing cell of sheet steel containing the potash solution, which, of coarse, does not attack steel. There was, however, much difficulty from the action of the potash on the soldered seams of the steel containing vessel. After many trials, however, Mr. Edison found a solder which seems to be entirely unaffected by the alkali.

In charging, the current is, of coarse, sent into the positive pole and its attached negative nickel plate, through the electrolyte, and into the positive plate of the iron compound which carries the negative pole. This current deoxidizes or reduces the compound to spongy metallic iron and carries the oxygen through the film of electrolyte to the nickel compound, oxidizing it to the hyperoxide of nickel, NiO_2, a higher oxide than the peroxide. In other words, the charging current simply carries oxygen in the opposite direction against the forces of chemical affinity, from the iron to the nickel, and stores the energy in the reduced iron, which is, of course, unaffected and passive in the presence of the potash solution. On discharge, the current passes from the positive pole through the external circuit to the negative pole, and then through the solution to the negative or superoxide plate. In so doing the oxygen moves back against the current and partially reduces the nickel superoxide NiO_2 while oxidizing the spongy iron. The energy of burning of the iron and oxygen which would be developed as heat in the ordinary chemical process is now liberated in the circuit as electrical energy.

The cell is an oxygen lift. Charging pulls the oxygen away from the iron and delivers it temporarily to the nickel. The condition is then stable, until the circuit of the cell is completed. Discharge then allows the oxygen to fall back from the nickel to the iron with the natural affinity of iron and oxygen.

This action is very different from that which takes place in the lead storage cell. Here, neglecting complication, the action is usually regarded for practical purposes as being represented by the equation

$$PbO_2 + 2H_2SO_4 + Pb = PbSO_4 + 2H_2O + PbSO_4 + \text{100 watt hours,}$$

where the left-hand side represents the condition of charge and the right-hand side the condition of discharge. Here oxygen is not simply transferred in discharge from the peroxide to the spongy lead, but the solution is changed (theoretically) from an aqueous solution of sulphuric acid to plain water. Of course the discharge could not practically be carried to the point of denuding the solution of all sulphuric acid, and a surplusage of acid must be used. The equation gives a mere theoretical outline of admittedly very complex reactions. In other words, the specific gravity of the sulphuric acid solution falls during the discharge, and the solution enters into the chemical combination. Theoretically, for every 445 grammes of active material on both plates, 196 grammes of sulphuric acid are required to effect the combination, or 44% by weight of the active elements, and in practice it is usual to allow a weight of sulphuric acid nearly equal to half the weight of the elements, or about one-quarter of the total weight of the cell.

(To be Continued.)

* Dr. A. E. Kennelly in Proceedings American Institute Electrical Engineers, New York meeting.

Cyaniding Complex Gold Ores.

Written for the Mining and Scientific Press by Frank H. Probert, A. R. S. M.

In the Mining and Scientific Press of May 11th Prof. E. F. Gropello gave an account of the Dorcas pneumatic cyanide process, which cannot fail to interest all those interested in the leaching of complex gold ores. The idea of adding oxygen to the potassium cyanide solutions is by no means new, cyanide of itself being incapable of dissolving gold, although in the MacArthur-Forrest patents no mention was made of this fundamental fact. In the ordinary cyanide process the oxygen is obtained either from the air dissolved in the solutions or from the air mixed up with the particles of the material to be leached; but in treating coarsely ground or heavy sulphide ores the action of the potassium cyanide is slow, owing to the supply of oxygen being insufficient. For this reason it is often necessary to treat one batch of material with two or three different solutions, draining one off as another is added; by so doing the mass becomes oxygenated. The Dorcas process supplies oxygen by forcing compressed air into the vats, thus ensuring a more rapid extraction of the precious metals. Patents have been taken out for chemically oxygenating the ore, instead of mechanically, employing such substances as hydroxyl, sodium hydroxide, alkaline ferricyanide of potassium, etc.; but they have not come into general use. Whether the oxygen is supplied by mechanical or chemical means, cyanide destroyers are formed by the oxidation of base sulphides and by the formation of caustic potash, which, in the presence of copper, arsenic or antimony sulphides, form soluble compounds and so destroy the solution.

It was my good fortune, while investigating some extremely complex telluride gold ores of Western Australia, about five years ago, to meet H. Livingstone Sulman, the inventor of the bromo-cyanide process, and together we looked into the problem of the treatment of complex ores by the cyanide process. The object of oxygenating a mass of tailings is clearly to produce potential cyanogen to form the required gold cyanide; but by so doing caustic potash is formed, which has a deleterious effect on the potassium cyanide when complex ores are under treatment. By employing a haloid salt we not only liberate potential cyanogen, but an inert product is formed, and thus a considerable saving in the consumption of potassium cyanide is effected, while at the same time the rate of solution of the gold is greatly increased. The haloid salt of cyanogen will not of itself dissolve gold; but in the presence of a soluble cyanide its action is very rapid. In my experiments I employed bromo-cyanogen in conjunction with a weak solution of potassium cyanide. The ore treated contained sylvanite and a little iron pyrite. It assayed twenty ounces to the long ton. In the sample battery a 33% extraction was the highest obtainable—this being apparently the amount of free gold contained in the ore—the plates very soon became foul and the slimes ran very high. I therefore concentrated on vanners and caught the slimes by coagulating them with a weak soap solution and milk of lime. I then took samples of the raw ore, concen-

trates and slimes and subjected them to the action of potassium cyanide solutions of different strengths, solutions of cyanide to which bromine water had been added, and to a mixture of cyanide and bromocyanide solutions. With a .5% solution of potassium cyanide I obtained a 46% extraction in five days on the raw ore, with the added bromine water 54%, and with cyanogen bromide 60% extraction in twenty-four hours. I then tried roasting the ore in a muffle furnace and repeated the tests. The extraction was considerably augmented, the KCy + CyBr solution taking out over 80% in less than eighteen hours; but I found there was an appreciable loss in the gold values due to roasting. Whether the tellurous oxide formed carried precious metal with it up the flues I cannot say; but it occurred to me that the oxide might possibly form a film round the particles of gold and so interfere with the reaction. I therefore mixed varying proportions of charcoal, coal and anthracite with the ore to be roasted, ranging from 1% to 5% by weight of the charge, and submitted the roasted product to the solution, as before. With a .5% KCy + .25% CyBr solution I was able to get a 96% extraction of the gold contents in eighteen hours, as against a 60% solution in five days with the ordinary .5% solution of potassium cyanide.

As it is expedient to have free potassium cyanide present with the cyanogen bromine, it is advisable to remove the cyanide-destroying compounds by washing with water before leaching is commenced. Bromocyanogen is not dangerous to work with, it is readily prepared, is cheap and quick in its action. Of course, as the solutions are used and reused there is a constantly increasing amount of potassium bromine formed; but, by the addition of an oxidizing agent, the atom of bromine is liberated and at once attacks the cyanide of potassium present, forming cyanogen bromide. If there is an excess of the solvent present, brown paracyanogen is formed; but experiments show that weak solutions are the more efficient. In practice the strength should never exceed .3% CyBr.

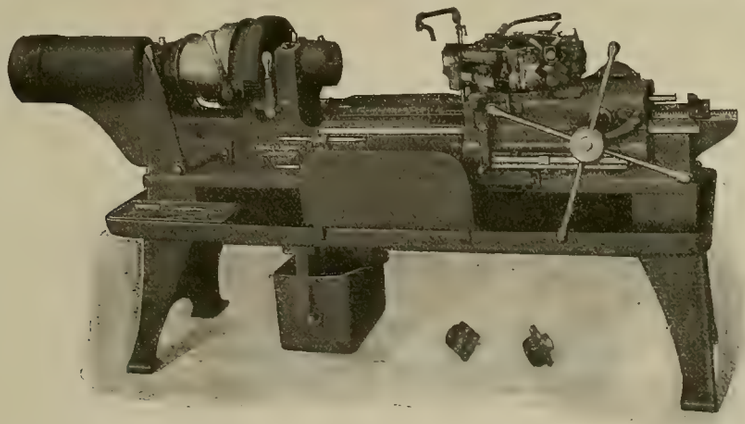
These few notes may be of interest to the readers of the MINING AND SCIENTIFIC PRESS, and, I trust, may be the means of the bromo-cyanide process being tried on the many classes of ore found where this paper circulates.

The New Hollow Hexagon Turret Lathe.

This lathe, the Parke & Lacy Co. of San Francisco, who are agents for it, say, embodies in its design important improvements and features new in this line of machine tools. It is especially adapted for producing duplicate machine parts accurately and at a minimum cost; but the tools are set and changed for different kinds of work, so that when there are but few pieces of a kind a saving of time is obtained.

It has a capacity of bars up to 2″ in diameter, which can be fed through the automatic chuck and turned any length up to 24″. The swing of the machine is 16″ over the Vs.

The bed, at the right, rests on a line bearing laterally, so that if the machine is placed on an irregular floor it will not be sprung out of alignment. Strength and rigidity are secured by casting the head solid with the bed. The head is equipped with back gears (triple back gears can be applied when required), which can be thrown in or out by friction clutch operated by lever, and the head cone, which has large diameters—9″, 11″ and 13″—takes a 3″ belt.



Hollow Hexagonal Turret Lathe.

The chuck is operated by a lever working through a system of compound levers, which gives a long movement to the spindle sleeve for feeding the stock and a powerful movement at the end of the stroke for tightening the chuck.

The same lever which operates the automatic chuck controls the roller feed; and since the roller feed does not depend for its power upon the revolution of the spindle, the stock can be fed with equal advantage whether the machine is running slow or fast, or even if it is standing still. By means of a single screw, both stock rolls and the centering or guide fingers are universally adjusted. The relation between the fingers and rolls is such that when the fingers are adjusted for centering a given-size stock the rolls are in the proper position to give the requisite pressure for feeding the bar through the automatic chuck. By this means it is only necessary to see that the guide fingers are so adjusted that the stock will slide easily through; and, as there is but one screw for operating the fingers and the rolls, the whole adjustment is quickly made.

This tool has other commendable features. The saddle slides directly on the bed, eliminating all overhang. The Vs are as large as in an ordinary lathe of twice the size. The automatic feed rack is attached to the bed midway between the Vs. It is as high up as practicable, as near as possible to the center of the spindle, and directly under the cutting tools, thus reducing to a minimum all tortional strains in the carriage when moving along the Vs. The automatic feed is not only thrown in, but can be thrown out as well, by a single curved lever, thus avoiding an extra lever for disengaging, as is usually required. The feeds for operating the carriage are secured entirely by gearing, thus doing away with belts altogether; and, by means of a lever, the rate can be changed without stopping the machine, giving either a fast, medium or slow feed, and enabling the operator to use whichever feed is best adapted to the cut.

Forest Endowment of Pacific Slope.

NUMBER II.—CONCLUDED.

By PROF. J. G. LEMMON.

GREATER DESTRUCTION BY HEAT.—Following the Glacial came a Thermal age, with contrary effects, yet with more destructive results. The ice melts on the southern verge of the ponderous ice cover, allowing the plants to return, timidly seeking the newly-emptied glacier beds. Soon after, the flood water sinking into the mountain sides, the brown earth, becoming vivified, invites the grasses and flowers to new-made homes, while sunny parterres beckon to the spying trees, promising centuries of occupation—if they can stand the climate.

The rising heat rolling in waves from the south, nearer and nearer, urges on the lagging columns, adding the necessity of avoiding death to the attraction of better homes.

But the universal return of plants from the south was prosecuted under vastly different, more destructive conditions than those of the northern flight. The plants on the return trip were attracted northward along the cool plains, and, also, some of them upward on the mountain-sides—for it is the same thing in effect to ascend a mountain for cooler weather as to journey northward.

Now, the first elevations beside a valley are usually low ones, foothills, outlying ridges or higher spurs. The plants that ascended these elevations, as the heat came on and proved too severe for their constitutions, were shriveled and burned then and there—the last battle ground and altar places where were immolated the greater part of the vegetable creation of the period.

THE LONE SURVIVORS.—Here and there straggling members of a family, reaching a locality on the plain or part way up a mountain when the present equilibrium of seasons was established, found themselves suited to the environment—and it is the descendants of those plants that are the inhabitants of our plains and mountains to-day.

These terminals of broken lines of development—these remnants of a past multitudinous vegetation—ever since they were allowed to exist and perpetuate their kind, have been obliged to wage war upon neighbors from generation to generation, in order to gain or retain a foothold, resorting to changes of ground, of character, of weapons, in order to win in the incessant battle of life.

PROCESS OF DOUBLE MIGRATION.—That the plants have made the double journey described is plainly proved by the characters of alpine plants on high peaks of the North Temperate zone. They are found to be identical with Arctic plants. Now, they could not have passed from northern regions directly to those summits during the southern flight, for the reason that both Arctic regions and these mountain tops were being slowly covered simultaneously with snow, soon becoming permanent ice. Manifestly cold-loving plants—our alpine plants—could ascend mountains only when fleeing from torrid heat, and exactly that condition was experienced on the return journey; so here on all the peaks of the north temperate zone are stranded Arctic species of plants, with less northern families established on the slopes of the mountains.

GREAT FOREST OF THE NORTHWEST.—It has been stated that Europe and Asia were deprived of their quota of plants by the many long transverse ranges of mountains preventing the passing of plants north or south, except through the wide gaps between ranges; while North America was favored by having nearly longitudinal ranges, permitting the free passage of plants to and fro along unobstructed plateaus.

The two long American watersheds—the Rocky mountains and the Alleghanies—deliminate three plateaus, Atlantic slope, Mississippi valley and Pacific slope. We have seen that the distribution of plants was not equal—the Pacific slope having the lion's share and largest growths. This is due principally to four potential agencies:

1. CONDUCTED NORTHWEST BY HIGH PLATEAUS.—The Rocky mountains, lying near the western side of the continent, extend southeasterly, upon the eastern side of the high plateau of Mexico, to Central America. The plants returning from the south at the beginning of the Thermal age, 80,000 years ago, were divided at the outset in southern Mexico, and a large part barred out of the Mississippi valley by the cordilleras, that killed off unfortunate individuals or families who ascended their foothills and spurs, as described, while other families or other members of the same families were attracted to the broad, free, and, at the time, cool and inviting pathway, along the high plateau of Mexico and Arizona, diminished at every degree by the many-spurred Rocky mountains, the survivors escaping to pass into the valleys and along the sides of the mountain ranges, some of them particularly directed northwestward again by the favoring coast plateau, decimated the while by the high, similarly inclined and destructive Sierra Nevada, to reach final destination in California and the region northward.

2. DISTRIBUTED BY WARM JAPAN CURRENT.—A very important agency helping on the capture and directing the distribution of the trees all along the western coast from California to Alaska, is the presence in the North Pacific ocean of the warm Kuro-Siwa, or Japan current, primarily a hot tropical current, striking the islands along the southern coast of China and deflected northward, to be more deflected by the Japan islands and hurled northeastward across the Pacific ocean, there striking the southern side of the long chain of Aleutian islands, which turn a part of the current down along the coast of America, delayed and accumulated during its long sweep by the many islands and capes on the way, while its heat rises into the atmosphere, carrying with it enormous quantities of water.

3. NOURISHED BY MOIST LANDWARD BREEZES.—Another factor closely connected with the preceding is found in the cool, broad, overrunning Pacific breezes that prevail most of the year on the northwest coast. Mingling with the heated and moisture-filled air over the Japan current, the volume presses inland, the moisture condensing and falling most copiously upon the nearest cool elevations—giving sustenance and stimulus to the richest and most remarkable forest on the face of the globe.

4. DEVELOPED BY SEMI-TROPIC HEAT.—The fourth factor necessary, it is found, for the production of largest growths, is a high degree of heat, of which the Puget sound region lacks sufficient for some plants, although many of her trees, such as the Noble, Grand and Amabilis firs, and the very valuable gigantic cedar, or shingle tree, become monsters, and the Douglas spruce, one of the most valuable timber trees on the earth, becomes in Oregon and Washington the tallest trees known—450 to probably 480 feet high!

This necessary heat is found under the semi-tropic sun in the latitude of California. This heat, added to the enclosed condition of the State—the high Sierra on one side, the lower Coast Range on the other admitting the ocean breezes through its passes, and with low, interlocking ranges at each end—furnishes just the right conditions, it seems, for strongest allurement to enter and for highest development afterward; for here only, in this cul-de-sac of California, are found the largest cone-bearing trees on earth, of some nine different genera; and here only are found the largest and heaviest cones of sixteen different species.

Is it not passing strange that out of the twenty pines of Europe and Asia, and the twelve pines of the Eastern States, not one should develop cones as large as either one of five pines in California?

TRIBUTE TO CALIFORNIA CLIMATE.—The great truth

is forced upon the attention that it is California that was set apart from all the world when, as the geologists tell us, the Pacific slope was raised from the ocean bed, in recent geologic times, by a mighty geotherm or earth heat wave, with the Sierra and Cascade Range as its axis of elevation, followed in a later age by another uplift, with the Coast Range as its axis; while the long, narrow valley between the ranges was cross-fenced by low mountains into several magnificent parks, principal of which are the valley of California, the smaller Willamette valley and the extensive Puget sound region.

Of these, California was assigned first place in the pathway of the southern fugitives, inviting to enter and urging to tarry and form a natural, unexampled arboretum within her mountain walls, supremely aided thereto by a semi-tropic sun dispensing beneficient heat—the whole array of factors mentioned conferring to produce the most generous and forcing climate on the face of the earth—as magnificently evidenced by this matchless forest endowment.

Mining and Metallurgical Patents.

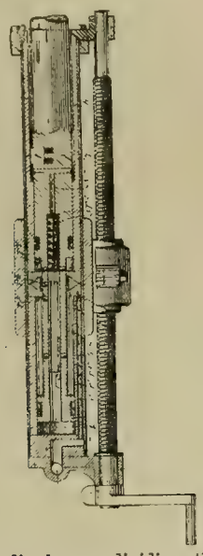
Patents Issued June 4, 1901.

Specially Prepared for the MINING AND SCIENTIFIC PRESS.

APPARATUS FOR CONVEYING GRANULATED MATERIALS.—No. 675,382; K. Frohnhauser, Dortmund, Germany.

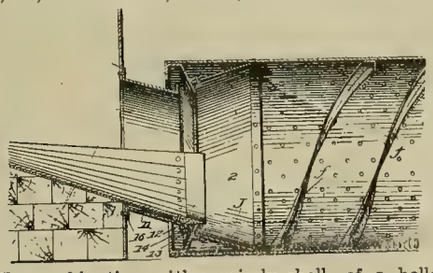
The combination of a trough or conduit on floor of which material is supported while being transported, a body of liquid in conduit, and propelling means arranged to move longitudinally of conduit and engage material, the liquid reducing weight and friction of material and assisting in conveying it.

ROCK DRILL.—No. 675,490; C. T. Litchfield, Spokane, Wash.



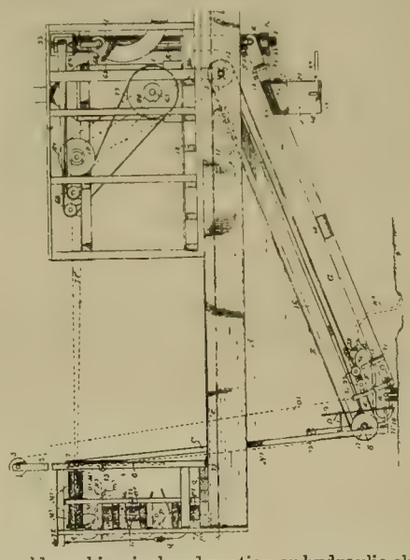
A cylinder, a diaphragm dividing the cylinder into two chambers one of which is inlet and other outlet for cylinder, a piston arranged in inlet chamber and a plunger arranged in outlet chamber, a hollow piston-rod passing fluid-tight through diaphragm and rigidly connecting piston and plunger, and having a series of ports near opposite ends, and valve arranged in hollow rod and provided with longitudinal bore opening axially at one end and laterally near other end and co-operating with several ports in hollow rod to control admission and exhaustion motive fluid so as positively to effect movement of piston in both directions.

GRIZZLY OR SCREEN FOR WASHING PLACER GRAVEL, PHOSPHATE, OR ANY ANALOGOUS MATERIAL.—No. 675,610; W. S. Russel, Toledo, Ohio.



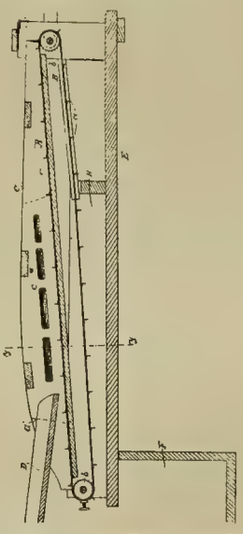
The combination, with a grizzly shell, of a hollow tapering cylindrical stopper shell located within receiving end of grizzly shell and having larger end throughout circumference engaging inner wall of grizzly shell and projecting toward discharge end of grizzly shell while smaller end is of less diameter than grizzly shell and projects toward receiving end of grizzly shell, and a tapering stopper ring located within receiving end of the grizzly shell in advance of stopper shell connected thereto and having larger end projecting toward receiving end of grizzly shell and secured to and engaging interior wall thereof.

GOLD SAVING APPARATUS.—No. 675,514; A. W. Lockhart, San Francisco, Cal.



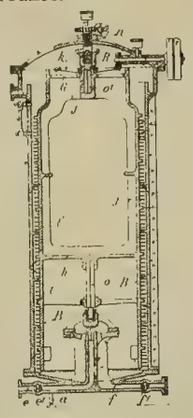
A gold-washing inclosed suction or hydraulic sluice, a discharge box consisting of a receptacle attached to sluice and covering an opening in side, receptacle having a hinged bottom whereby load upon bottom of box releases lever and allows rocks to be dumped and whereby hinged bottom is closed again as soon as released of its load, and means for projecting rocks or other material from sluice into discharge box.

WATER SAVING MINING MACHINE.—No. 675,583; F. Auser, San Francisco, Cal.



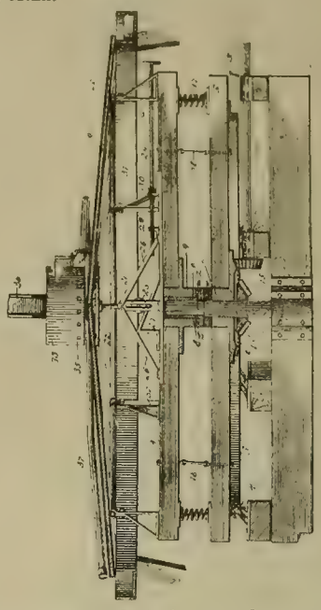
A sluice box and an endless traveling belt with riffles; side protectors with apertures, having on outsides covers to keep water flowing through apertures confined to box below—all in combination with means for saving water in a receptacle.

AMALGAMATING APPARATUS.—No. 675,660; A. Lavoix, Paris, France.



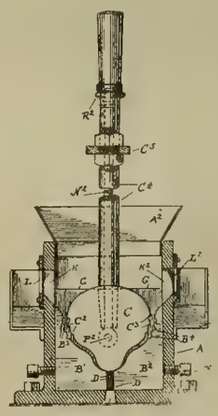
The combination with a vertical exterior cylinder; a cover to cylinder and a pedestal in bottom of cylinder; of an interior, vertical, revoluble cylinder journaled as to its lower end in pedestal and adapted and arranged to turn within exterior cylinder; a screw piercing cover and arranged to form bearing for upper end of interior cylinder; a worm-wheel on screw; a worm engaging wheel; means for actuating and supporting worm, whereby facility is afforded for regulating pressure of screw upon interior cylinder; of a bevel gear-wheel mounted upon top of interior cylinder; a shaft journaled in cover of exterior cylinder; a pinion mounted on shaft and engaging bevel wheel, and means for actuating shaft, whereby the interior cylinder is made to revolve within exterior cylinder.

CONCENTRATOR.—No. 675,799; E. A. Sperry, Biwabik, Minn.



A base, an intermediate frame and an upper frame, a shaft on which intermediate frame is mounted to rotate, having an eccentric portion on which upper frame is mounted, a gearing for rotating intermediate frame on shaft, a gearing for rotating shaft, and a table supported on upper frame, two frames and table being rotated together.

QUARTZ MILL.—No. 675,872; A. Ford, Golden Gate, Cal.



Shoes separated to provide a discharge opening and having inclined undulating surfaces, plates closely set on edge between shoes and acting to screen material passing through discharge, and a rocker placed between shoes above plates, and having inclined undulating surfaces complementary to shoe surfaces.

PICK.—No. 675,626; E. H. Grim, East Radford, Va.

Opposite cutting members, having inner ends overlapped and provided with inner corresponding recesses forming a handle receiving eye, inner end of one member having hook, provided with intermediate lug or projection upon outer side, and adjacent portion of other member having recess for reception of hook, and having a groove notch in its wall for reception of lug or projection, and a detachable fastening for members at opposite side of eye.

COMPOUND OF MATTER FOR ARTIFICIAL FUEL.—No. 675,639; L. Patry, Montreal, Canada.

The composition of matter for artificial fuel, consisting of crude petroleum, potash, common asphalt, unslaked lime, and peat, in proportions specified.

MINING SUMMARY.

Specially compiled and reported for the MINING AND SCIENTIFIC PRESS.

ALASKA.

Jarvis & Crowell and Captain H. N. James have bonded to Patrick Clark of Spokane, Wash., five claims a few miles back from Crackerjack P. O., Prince of Wales Island, for $75,000. He will develop them at once.——R. Allison bought a one-third interest in a claim on Twelve-mile Arm for $100, from which claim he took eighty-three pounds of ore and sold it to the assayer at Crackerjack for $415, or $5 a pound. The claim was located during the winter. It is a free-gold proposition and is very rich.——The Mt. Andrew M. Co., on Kassan Peninsula, have shipped in this spring 130 tons of supplies to their camp near Grindall.

ARIZONA.

YAVAPAI COUNTY.

The Bullard group have been placed with a German syndicate of New York for $575,000, the promoting syndicate to sell to another one for $1,250,000. The group consists of twenty-seven claims. The development of the property has resulted in the discovery of a large body of ore of good value in gold and copper. R. E. Fowler of Salt Lake City, Utah, has turned the management over to representatives of the New York people.

The Gold Wing group in the Gila mountains, near Adonde, have been bought for $10,000 by the Arizona & Arkansas L., Z. & C. M. Co., a Los Angeles, Cal., corporation.

W. H. Barnes of Tucson has sold for $100,000 the Henrietta mine, which was bought by him several months ago for $20,000. This mine is one of the oldest properties in northern Arizona.

CALIFORNIA.

ALPINE COUNTY.

The old Colorado mill at Loope, after a shutdown of twenty years, was started on the 10th on ore from the Lewis mine at Gardnerville, of which Capt. P. Curtz is superintendent.

AMADOR COUNTY.

Robinson Bros. are said to have recently made a good strike in their gravel claim, near McLaughlin's station. They took out one nugget weighing $165, and have taken out a number going from $8 and $10 up to $25 and $30.

Work is progressing on the Amador Phœnix mine, near Jackson. The shaft has been cleaned out and retimbered, and ore is being taken out. A 10-stamp mill is being put up, and within six weeks will be working.

BUTTE COUNTY.

The Nevansville Drift M. Co., operating at West Branch, have elected J. T. Hallett Pres., G. P. Rixford Sec., A. Van der Naillen, Jr., Gen. Mgr. and P. L. Shelford Supt. The latter has taken charge, and is reopening the mine, which has been closed down some time.

CALAVERAS COUNTY.

Rich ore has been struck in J. B. Maguire's mine at Mokelumne Hill. Some of the rock contained more gold than quartz and a single specimen was sold for $50.

Reed & Haggerty, prospectors, have made a lucky find while working on the Tom & Dick mine, at Mokelumne Hill. They have uncovered a 12-inch ledge of fine ore.

The old Innes, now the Giuffra quartz mine, at Mokelumne Hill, is to be reopened by H. Thompson. He has bought the El Encino hoist and has removed it to the Giuffra mine. Sinking in the shaft will be commenced.

The Salvator G. M. & M. Co. has incorporated, to mine at Mokelumne Hill, with Directors H. C. Newman of San Francisco, W. C. Ramsey, F. R. Clark, H. M. Lander, P. Taglio and G. B. Parkinson of Stockton, and F. Lagomarsino of Mokelumne Hill.

J. O. Stewart of the Anglo-Saxon mine, at Rich Gulch, says work will soon be started on the Tiger vein of that mine.

J. C. Jens has taken charge of the Loring property, at Rich Gulch, and is erecting a blacksmith shop, boarding house and other buildings, and will soon begin sinking a new shaft.

Water was struck in such quantities recently at the Whittle mine that operations had to be suspended, there being 27 feet in the shaft. It could not be handled by the whim, and an engine will be put in at once.

New and heavier machinery is being put the Jones mine at Glencoe, and the old is being removed. The new hoist is nearly completed. The mine is owned by the Fanny Maria G. M. Co.

The McHaley mine, above El Dorado, as resumed sinking. The Emery Co. has a bond on it and will sink the shaft 200 feet deeper and crosscut to the ledge.

J. S. White and associates have taken the Austrian Hill placer mine, at Cave City, and hydraulicking will begin soon. The old ditch has been enlarged and reservoirs built.

Dixon & Edmonds have put a pump on the old Gunther gravel mine and are unwatering the old workings, preparatory to breasting out gravel.

Both the north and south drifts on the 400-foot level of the Oriole mine, at Carson, have opened up rich ore, the rock being said to be literally filled with gold. The work of erecting the mill will be rushed.

Surveyors of the Southern Pacific Co. have surveyed an extension of the narrow gauge system from Valley Spring to the Gwin mine, a distance of 6 miles. The Gwin G. M. Co. are said to have offered a bonus for the extension, and the survey is made to ascertain whether or not the proposition by the mining people will justify the outlay by the railroad company. If made, the terminus of the narrow gauge system will be within 6 miles of Jackson.

As soon as the Cuneo ditch is cleared, work will be commenced on the mine at Fricot City. The tunnel, now in 200 feet, will be run 200 feet farther. The mill will be kept running steadily.

Mr. Moores has commenced work on the Grace Darling mine, at Fricot City. A tunnel will be run to open the vein at a depth of 400 feet.

The Garibaldi M. Co. has suspended work on the Garibaldi mine, the pump failing to keep out the water. A larger pump will be put in and work resumed.

EL DORADO COUNTY.

The old Burnham mine at Georgetown has been bonded to a Mr. Kelley, representing Butte, Mont., people, at $10,000.

The Starlight mine, near El Dorado, has been bonded.

KERN COUNTY.

J. Smith is finishing operations on the tailings of the Little Butte mine, there being only 100 tons more to treat. The last clean-up was $950. The slimes are now being treated with the usual difficulty in making the percolation. He has installed a compressor and is pumping air through the mass. This has the mechanical effect of separating the particles so that the cyanide can do its work, and also furnishes oxygen.

MONO COUNTY.

Supt. C. H. Glines of the Par Value-Arnot mines has started up work and is repairing damages done by the storms last winter, the mill and other buildings having been crushed in by the weight of snow that fell.

Supt. J. W. Kelly of the Bodie south end mines expects to have the Red Cloud shaft equipped with hoisting machinery within thirty days, when development will be commenced.

NEVADA COUNTY.

It is reported work will be resumed at the Banner mine at Nevada City. J. R. Phillips of Stockton, formerly Supt. of the mine, is at the mine, accompanied by A. R. Adams of New York.

D. E. Matteson, F. J. Thomas, J. M. Thomas and C. E. Clinch of Grass Valley have bought a controlling interest in the Tule Belle M. Co. and have bonded several adjoining properties, aggregating 164 acres, about ¾ mile from Grass Valley and southwest of Massachusetts and Gold Hill. The Cincinnati claim was extensively worked in early days, but the others are new properties. On the Tulle Belle there is a shaft 200 feet deep on a vein from 12 to 18 inches thick. The company will continue this shaft and prospect their ground through it. The work is to be started at once. The Tule Belle Co. has elected D. E. Matteson president, J. R. Tyrrell secretary and A. J. Blackburn Supt.

The engine, boiler and machinery for the reopening of the Lamarque group of mines have been placed in position and are in working order. The engine is 40 H. P. and the owners say capable of hoisting from a depth of 1200 to 1600 feet. The shaft will be pumped out. It is down 320 feet and it is understood that not all the ore in sight has been stoped out. That taken out was of high grade and said to have averaged $31 per ton at the mill. The Lamarque was but recently bonded by E. J. Caldwell and C. F. Seitz.

SHASTA COUNTY.

E. W. Brackett has uncovered a shoot of sulphuret ore in the Mount Pleasant mine, west of Redding. The mine has been a steady producer all winter, the output being sent to the Keswick smelters.

The Mammoth group of copper claims in the Backbone district, west of Kennet, have been bonded to F. G. King, who has put a crew of men at development work on the Mammoth, one of the group. Lindley Morton, representing California capital, is said to have offered him first $25,000 for his option, and now the amount has been increased to $40,000.

The Mount Shasta G. M. Co. have incorporated to work the Mount Shasta mine. The incorporation was made in South Dakota, with a capital of $1,000,000. The directors are L. F. Menage of Minneapolis, F. E. Ware of San Francisco, H. S. Gilette of Chicago, H. S. Anderson and O. Nelson of Pierre.

The new smelter of the Trinity C. Co. will probably be located 1 mile south of Kennet at the juncture of Squaw creek and the Sacramento river. B. Golinsky agrees by contract to deed forty acres of land to the company free, under certain conditions, one being that the building of the smelter must begin within ninety days. The Trinity Copper Co., of which T. W. Lawson is the head, has a working capital of $750,000. A large number of men are employed opening the mines and building roads.

SIERRA COUNTY.

Five tons of sulphurets from the Gold Bluff mine at Downieville have been shipped to the Selby Smelting Works.

W. F. Johns, Supt. of the Sierra Buttes mine, representing the Sierra Buttes M. Co., gave possession of the Plumas Eureka mine at Johnsville to Lessees J. K. O'Brien, W. Metcalf and F. Vanzini.

It is reported that a rich body of ore has been struck in the Telegraph mine at Fir Cap. The tunnel has been driven on the foot wall of a ledge which has been showing up very favorably and offers a good milling proposition. The tunnel is being pushed ahead for the purpose of striking the gravel channel.

The California Debris Commission will hold a special meeting on June 24 to hear applications to hydraulic from A. Lundberg, in the Joseph Thomas mine, at Plymouth, Amador county, to deposit tailings in Indian creek, and from S. I. Simmons et als., in the Victor placer mine, in Negro canyon, Sierra county, to deposit tailings in Charcoal or Negro creek.

Extensive improvements are to be made at the Plumbago mine at Alleghany. The electrical machinery is to be added to and improved. The power house on the Middle Yuba river now has two dynamos. Two more and other machinery are to be added to this plant. When completed electricity will be furnished the Oriental and Oceola mines, also at Alleghany. On the latter a 10-stamp mill will probably be erected soon. The distance of transmission is about 10 miles. W. J. Organ is in charge of the proposed improvements.

SISKIYOU COUNTY.

The Blue Ledge M. Co. of Crescent City, who own copper and gold claims on Joe creek, a tributary of the Applegate river, have their tunnel in about 90 feet and running in solid ore, which assays from $4 to $60 in gold and from 3% to 30% copper.

J. Kelley, who has been prospecting for a few months past in the hills near Mugginsville, Scott valley, shows some very fine specimens of quartz, full of gold, and thinks he has struck a bonanza.

It is reported that a prospector has discovered a strong quartz ledge on Klamath river, near Honolulu, which he has traced a long distance and which is 150 feet in width.

A large porphyry dike has been opened up on the Mountain Laurel mine, owned by the Yreka M. & M. Co. of Rollin. It averages from 10 to 15 feet thick and the pay shoot is from 40 to 50 feet and mills from $10 to $15 in free gold.

The Jillson mine at Henley is reported to have struck the pay shoot again.

G. Gerkin has bonded the Flying Dutchman and Gold Standard mines, near Cecilville, owned by Harry Bowerman, and put men at work prospecting.

Peterson Bros. will take out not less than $4000 for this season's washing. Some of the gold is very coarse.

J. Daggett, manager of the Black Bear G. M., at Black Bear, says that the big Yellow Jacket ledge is prospecting finely and that it will furnish milling rock.

SOLANO COUNTY.

The Pacific Portland Cement Co. has been incorporated to operate a cement works near Suisun. The capital stock is $1,000,000, and the company has bought a deposit of cement rock of satisfactory quality for the manufacture of Portland cement. The cement plant will require about thirty acres of land, and is expected to cost about $250,000, and, including other improvements to be made, the total outlay will exceed $500,000. The company consists of San Francisco people.

The Armijo Oil Co. at 350 feet has struck a strong seepage of a clear yellow petroleum of superior quality in the well they are drilling 3 miles north of Fairfield.

The Vacaville Oil Co. at 1200 feet, after casing off a very large flow of salt water, has developed a strong gas flow and a little oil at their well at Vacaville.

TUOLUMNE COUNTY.

The Laurel G. M. Co. have eight men at the Free Lance, on the Dan Berger ranch, under Supt. J. Richards. A mill test of fifty tons of ore is being made. Assays recently made show a value exceeding $8 per ton. This mine is so situated that mining and milling of the ore can be done very cheaply. There is a 5-stamp mill, concentrators and everything necessary to carry on the work of mining in a systematic manner.

At the Jumper mine, at Quartz, the clean-ups of the past two months have been satisfactory, the sixty stamps crushing ore from the Jumper and Golden Rule mines. In the latter, at the north end, the company is taking out fine rock in considerable quantities. The shoot has proven more extensive than was anticipated when first struck.

At the Goldwin mine, near Carters, about four weeks ago, a vein of good ore was struck. Of this vein, 7 feet wide at that point, a streak about 13 inches wide next to the foot wall was very rich. Since then they have sunk 50 feet in ore, and with depth the quality improves and the vein grows wider, being now 16 feet; and the rich streak next to the foot wall shows 3 feet. A new 10-stamp mill has been erected and is being tested preliminary to starting the crushing of ore.

Williams & Emslow have bonded the Feliciana mine, at Moccasin creek, and will go to work at once.

The Ajax's hoist and mill, recently completed, has started up.

No. 3 shaft on the Santa Ysabel, originally the old Miller & Holmes shaft, is being unwatered and work is to be resumed there at once. Nos. 1 and 2 are completely shut down.

The mill at the Draper mine is now completed. Considerable work is laid out, including a trestle work for a car track and a large ore bin. A canvas plant is also projected. The mine is said to be looking well.

A new 5-stamp mill is being erected on the Mayflower, above Summerville.

YUBA COUNTY.

Salt has been recently manufactured in a small way from the water of a salt spring on the McMillan place near the old Sweet Vengeance mine at Brown's Valley. It is believed by sinking wells that a sufficient quantity of the water could be had to make a profitable business of the salt manufacture.

COLORADO.

ARAPAHOE COUNTY.

For the five months ending with May 31st the receipts of gold at the Denver branch mint reached $7,506,210.94, compared with $7,517,182.91 for the same period last year. This season the books were closed one day early, and on that day $206,000 in gold was deposited. The placers have thus far made but few deposits.

CLEAR CREEK COUNTY.

C. Hulberson has interested Eastern people in a group of eight claims near Georgetown, who propose to make a systematic development of the property.

The Gillard mine, idle for some time, is beginning work again. When the mine was working, the contractors sinking the shaft opened some fine-looking quartz, showing visible gold. A sample was sent to Denver and assayed, giving 23.90 ounces in gold and 77.30 ounces in silver per ton. The shaft is now down a little over 100 feet and work will be continued by drifting on the vein and sinking 100 feet deeper. A shafthouse has been erected and machinery is in place in it.

DOLORES COUNTY.

S. O. Burgwin and partners will do considerable work on the Como group, near Rico. This group embraces the Amorette, Emma, Eclipse and Smuggler veins on the north side of the river, which have produced some very high-grade ore.

HINSDALE COUNTY.

E. Ray, manager of the Sherman mine, near Lake City, says in a recent report to the company office in Denver that the workings on the Champion lode are looking remarkably well. The drift on the vein is advanced 14 feet daily, and at the face shows 6 feet of ore. The ore taken out has shown from 15% to 17% copper.

The Contention M. Co., at Lake City, intend to erect a 100-ton concentrating mill at once, and grading for it is under way. The mill will be so constructed as to receive the ore directly from the mine cars, which will dump into bins at the crusher. The process for reducing the ores to concentrates will be similar to that in use by the Golden Fleece Co.

LAKE COUNTY.

F. X. Hogan has made formal application to the city council of Leadville for a lease on the mining rights under the streets and alleys, and the proposition is now under consideration. Mr. Hogan believes some fine stopes will be developed and he is willing to sink shafts and explore for them. The strike and trend of

the iron channel as proven in the Home Extension seems to be crossing Harrison avenue.

ROUTT COUNTY.

It is reported that a rich strike has been made in the new copper district at Farwell, east of Hahn's peak, by C. Morris and J. Wagner, lately from Philadelphia, who, in clearing for the foundation of a cabin, uncovered an 8-foot wide vein of ore about 3 feet below the surface, which assayed, it is said, 17% copper and thirty-five ounces silver, a total value of $70 per ton.

SAN MIGUEL COUNTY.

C. Bullock, president of the Butterfly-Terrible Co. of Telluride, says the results of the amalgamation on the mill plates for the last two weeks of May were about $6400. The total production for May was 1360 tons, yielding about $13,000. The profit on the month's operations will be above $6500, the expenses being not more than 50% of the output. The saving made in amalgamating and concentrating is remarkable. Careful assays of the crude ore and of the mill tailings show that the latter contain but 3% of the value of the ore.

A. B. Frenzel has been prospecting for some time in the vicinity of Newmire and Placerville for some of the rare metals. He claims to have been successful. Near Newmire he has nineteen claims yielding a vanadium ore. It is a bedded formation resting on sandstone and capped with limestone. In appearance the ore resembles the sandstone, but is colored green. He claims much of it will run 6% and 7% in vanadium, and that 2½% is sufficient to make a good shipping ore. He is preparing to ship an experimental carload of five tons to Europe. If it results satisfactorily, a local treatment plant is to be built. The large use of vanadium is in some steel-making processes. Mr. Frenzel says he has also found uranium ores in Placerville which he proposes to develop.

SUMMIT COUNTY.

After a series of experiments, the Cashier mill, at the Cashier mine, at Breckenridge, is successfully treating seventy tons of ore per day. Twenty-five to thirty men are employed in the mine and mill, and Manager Wood says the property is on a dividend-paying basis.

TELLER COUNTY.

The Granite mine, on Battle mountain, has resumed operation, and within a very short time about 200 men will be employed.

The claim of the Marie M. Co. to a lease on the Pharmacist was revived recently by a court order appointing J. Murphy receiver of the leasing company, to take possession of the property.

Copper ore has been opened up near Cripple Creek, on Bluff mountain, 1 mile from the mouth of the old Moffat workings on Red mountain, known as the Galena. The ore has been thrown over the dump in the search for gold by an Eastern company. C. Keafer, Supt., sent some of the ore to the company office at Canton, O., where it was found to carry copper. A mill test made later returned 12.76% copper. The ore has been opened on the Diamond claim, owned by the Canton G. M. & M. Co., which also owns twenty-one acres in addition to the Diamond.

It is reported that the visit of N. P. Williams, president of the Isabella Co., to Europe is in connection with the sale of the property.

The Monument Co. has granted two leases on its Battle mountain property, the north end of the recently purchased Mary Alice claim going to D. Heaton and the south end to H. T. Brown. Extensive developments are projected by both lessees.

IDAHO.

BOISE COUNTY.

This is written from the Pearl district, 25 miles north of Boise City. Here is a granite-porphyry formation, cut by numerous parallel veins which run east and west and pitch to the north. The vein characteristics are iron and lead bases, carrying gold, silver and lead values. Near the surface the ores are oxidized, with sulphides below the 100 or 150 foot levels.

The Checkmate mine and mill, belonging to Salt Lake City parties, with J. W. Thompson as superintendent, is the best illustration of what the district is or can be. The Checkmate shaft is 400 feet deep, with levels run on the vein at each 100-foot station, aggregating possibly 2000 feet of work on the vein. Here all below the 100-foot level are sulphides, and the forty-five to fifty tons of ore being hoisted daily comes from below that level. Steam power is used for hoisting and larger facilities are to be put in.

The mill has a crusher, ten stamps, amalgamating plates, two Wilfley tables and one Johnson. Below the plates are a series of gold traps, consisting of two cylindrical tubs, each 10 inches diameter at the top, 6 inches at bottom and 16 inches deep, with a pipe to carry the plate tailings to the bottom of the tub, where the requisite amount of quicksilver is deposited. The constant overflow from these tubs passes through a series of boxes, each 4x6x16 inches, where certain coarse, rusty particles of free gold are caught by gravity. This product passes to a pan with a revolving muller, containing quicksilver, where these gold particles are brightened and amalgamated. Finally the pan tailings go to the settling tank, and settlings therefrom are shipped as concentrates, carrying two ounces gold, fifteen ounces silver and 15% lead.

The overflow from the gold traps passes to the Wilfley tables, which make a coarse, heavy product, the slimes from the latter being elevated to a classifier. The settlings from the latter are treated on the Johnson concentrator, the overflow from the classifier passing to canvas tables. The product of the Johnson concentrator runs about ten ounces silver, one and one-half ounces gold and 12% to 15% lead. The concentrate product, as a whole, represents about six tons ore to one ton concentrate, and carries about 3½% silica and 30% iron. It is claimed that 90% of the assay values are saved, about 40% of the total saving being by amalgamation. About one-fourth of the mine tonnage is sacked and shipped to the smelters without concentration.

The I. X. L. mine and mill are under the management of H. W. Dorman. The northeast and southwest vein here is opened through two tunnels, one of which cuts the vein at 135 feet from entrance. There are about 250 feet of work on the vein on this level, besides a winze 40 feet deep and several upraises. A lower tunnel is being driven that will cut the ledge 850 feet below the upper tunnel. The mill on the property is provided with crusher, two sets rolls, revolving screens and Bartlett tables and plates. The ores are an iron sulphide, with good gold and fair silver values. A shipment resulted quite satisfactory. The mill is now idle, but it is expected to resume work soon.

The El Paso, in the same locality, is being well opened up.

This entire district is in a range of hills that overlooks the valley of the Payette river. WASCOTT.

Pearl, June 4.

S. L. Tipton has bonded the "You Know" group at Pearl. Considerable development has been made on the property, making an excellent showing. The ore at depth is sulphide, though on the surface it is free.

The Twin Sisters mine, in the Boise basin, near Centerville, is being equipped with a 5-stamp mill. The property is owned by Pittsburg, Pa., parties, J. Hutchinson of the Trade Dollar Co. being general manager, and E. F. Blaine superintendent. The latter says that a mill will be installed as quickly as possible for the purpose of ascertaining the actual value of the ore. The development has reached a vertical depth of 250 feet. There is a considerable body of ore opened up.

IDAHO COUNTY.

At the stockholders' meeting of the Buffalo-Golden Gate M. Co. the following officers were elected: President, E. C. Steele; secretary, G. W. Tannahill. The company owns the Gold Bug, the Golden Eagle and the Old Gold claims in Buffalo Hump. Considerable development has been done and the company states that men will be put to work on the claims at once.

The Blue Jacket M. Co. intends to install a 30-ton smelter near its property in the Seven Devils this season. Manager F. J. French of the company has stated that this would be done.

SHOSHONE COUNTY.

Wardner people who own a group of claims near the Crown Point have formed a company. They have purchased the 150-ton concentrator which stands on the Granite, in the Coeur d'Alenes. The company is called the Wyoming M. & M. Co. P. P. Weber of Wardner is president. They have contracted for 200 feet of tunneling and a wagon road to the mine.

MONTANA.

The Bear Gulch Railway & Con. M. & S. Co., capital $2,500,000, has been incorporated at Spokane, Wash., by H. Bush and M. Strong of Spokane, Wash., and A. Livingston of Livingston, Mont., to operate in Bear gulch, near Cinnabar. A 20-mile railway to connect the mines with the Northern Pacific system is under consideration.

FERGUS COUNTY.

A. S. Wright of Denver is reported to have made a rich find in South Moccasin. He has a bond at $50,000 on the Cliff and Moshener mines in Whiskey gulch, and since the first of March, it is said, has taken out more than $40,000. The mines of Whiskey gulch are described as on a mountain of ore, with pay from comparatively shallow workings, all of which are in ore. The ore requires cyaniding and one large mill has been erected, which has all the ore it can handle. Another mill will be erected this season.

The owners of the Kendall group, near Lewiston, have incorporated the Kendall G. M. Co., capital stock $2,000,000. The trustees are A. B. Campbell, J. A. Finch and R. K. Neill of Spokane, H. Wick of New York and H. T. Kendall of Lewistown.

FLATHEAD COUNTY.

The Canyon group, about 12 miles from Foundation, has been bonded by G. Wurm of Thompson Falls to F. Stevens of Murray, Idaho, at $50,000, time eighteen months, and first payment in four months. Work is to begin immediately and continue without interruption. It is a free gold property.

JEFFERSON COUNTY.

A strike is reported made in the Elkhorn Queen mine at Elkhorn. Specimens of ore carrying native silver in large quantities have been taken out. The extent and value of the strike are not known at the office of the company in Helena.

LEWIS AND CLARKE COUNTY.

L. S. Woodbury of Great Falls, who recently bonded forty acres in Kenwood, has commenced work on a shaft.

Mr. Dougherty of Omaha is said to be planning the construction of a 50-stamp mill at Mammoth, to be run by electricity generated by water power from the South Boulder. The men at work in the mines have been laid off until the mill is erected.

MADISON COUNTY.

J. Berkin and E. J. Roller of Butte have sampled the Kearsarge mine, near Virginia City. It is understood that they will buy the bond on the mine at $10,000, now held by C. E. Damours.

NEVADA.

LANDER COUNTY.

G. A. Thorpe has started work on his antimony mines, near Austin, taking out ore for shipment.

LINCOLN COUNTY.

F. C. Perew of Searchlight has arranged to buy a 20-stamp mill, to be erected at the Quartet mines, in Searchlight district. The company has an 80-stamp mill in operation on the Colorado river, the ore being hauled from the mines to the mill while awaiting the completion of the railway now being constructed. This new 20-stamp mill, Mr. Perew states, has been made necessary through the striking of a considerable body of water in one of the company's claims. He is quoted as saying: "In twenty-four hours after striking the water our heaviest pump was working and threw out 50,000 gallons of water. This did not reduce the flow at all, and we feel that the water question is solved; we will get our mill at the mines, instead of having it several miles away on the river."

R. S. Seibert of Los Angeles, owner of the Potosi mine in the southern part of the county, has leased and bonded the property to C. M. Thayee at $100,000.

LYON COUNTY.

The Excelsior Co.'s smelter in Mason valley started up recently and the first twenty-four hours turned out copper matte valued at $6100. After a few days it was shut down, the iron ore supply giving out. The matte is between 60% and 70% fine. In the mine the ledge has been cut on the 200-foot level and shows 45 feet of the same ore as the company has on the 50-foot and 100-foot levels, and the wall on the 200-foot level has not been reached.

NYE COUNTY.

The last returns from ores shipped from Tonapah are as follows: Dunlap, Douglass and Stewart, 302 ounces of silver and $75 gold; Brougher, 423 ounces of silver and $78 gold; D. Fitzpatrick, 300 ounces of silver and $85 gold.

Seven carloads of Tonapah ore were shipped to Selby's recently.

It is reported that there are now 500 people at Tonapah, including forty women.

J. G. Booker, who is surveying the county line at Tonapah, has written a letter to Commissioner Douglass, in which he says that he has not yet completed the work; but, from the measurements so far taken, he feels justified in saying that Tonapah is in Nye county.

At the present time there are about 400 men employed in Tonopah, mostly on leases, and the lowest grade of ore being shipped out is over $100 per ton. Much goes seven and eight times that amount. From eight to twelve teams are employed daily in hauling out the ore to Sodaville, the shipping point. J. Butler, the discoverer, owns five-eighths of all the claims in that vicinity, but is leasing them at a royalty of 25% of the net result. Considerable development work is being done on all the claims in the district, and the most flattering results have been obtained. In fact, it is stated that every foot of ground which is excavated in a shaft 6x8 feet represents a gross value of $750.

WASHOE COUNTY.

N. B. Clark of the C. & C. mine, on Peavine, says a shaft on the lead shows very rich ore at 180 feet depth. A tunnel is being run to get a depth of 500 feet, and is advanced 460 feet. A blind lead 12 feet wide with well-defined walls has been crossed. Samples assayed $7 gold, 20 ounces silver and 2% copper. Drifts will be run on the lead.

R. W. Parry of Reno has received orders from J. T. McCarran, vice-president of the Empire M. Co. of New York City, directing him to send men to the Pyramid mine to resume work.

Dr. W. H. Patterson of Reno has bought the V claim, adjoining the Francovich Piazza mining property in Olinghouse canyon, paying, it is said, about $3000 for it. It is understood that the doctor will develop the property.

NEW MEXICO.

GRANT COUNTY.

The Clifton C. Co. has made a strike in its Wildcat mine in Santa Rita district on the 160-foot level south, where it cut an intersecting vein, showing a solid body of sulphide ores of satisfactory character and values. The 100-ton concentrating plant is now under construction and will be completed by August. It is the intention of the company to sink a double-compartment shaft, through which the ore for mill will be hoisted and delivered directly into the ore bins at the mill by gravity.

The Silver City reduction works will put in a new furnace of 200 tons capacity. The three furnaces in operation at present treat eighty tons each.

The Pinos Altos M. Co. is making extensive improvements at their Gilette shaft. Their concentrator will be enlarged to nearly double the present capacity.

The Gopher mine at Pinos Altos is being pumped out and put in shape for examination by experts.

RIO ARRIBA COUNTY.

The air compressors and steam pump are now being installed on the Strawberry claim in the Bromide district, owned by the New Mexico G. & C. M. Co.

The Burnt Mountain M. Co. and the St. Michaels M. & R. Co. have consolidated, the new company taking the name of the latter company. It owns eight claims in Bromide district

The Pontiac M. & M. Co., owners of the Independence group, are ready to start work. A 100-foot shaft will be sunk on the Independence claim. A mill site has been located on Tusas creek.

The Admiral G. & C. M. Co. will resume work soon with increased hoisting ing facilities.

OREGON.

BAKER COUNTY.

C. Glass and J. W. Witherop, who recently bought the Orofino, near Sumpter, are planning the immediate installation of a large machinery plant for deep development, and are also considering the erection of a 20-stamp mill. A mill test of eight tons gave $80 per ton in free gold alone.

JACKSON COUNTY.

The Clio M. & M. Co., operating near Jacksonville, has been reorganized under the management of R. A. Parker, M. E., of Boston, Mass. J. E. Potter, the former manager of the mine, has sold his interest in it to the present company. The mill was started on the 5th inst.

C. Linder, the electrician and promoter of the new electric power plant at Jacksonville, will start the preliminary surveying at once.

The Republican 10-stamp mill is running and the Willette Co. will start up its mill shortly.

The Shawmut Co. are to begin grading for the 100-stamp mill.

The people who have the Felecia mine bonded are sinking a shaft and getting some rich ore. T. W. W.

Jacksonville, June 6.

JOSEPHINE COUNTY.

W. H. Dana, of the Copper Stain mine on Mt. Reuben, near Grants Pass, says a number of men are engaged in sinking on the vein in this mine.

W. Kramer of Galice creek took $700 gold from a fifteen days run with an arastra in his quartz mine.

C. B. Beardsley of Chicago, of the Old Channel M. Co., is at Galice, where the company is engaged in making the final cleanup for the season. The mine this year has been worked on a more extensive scale than ever before.

WASCO COUNTY.

A contest for the possession of the Oregon King gold mine at Ashwood is on trial

at Portland. The mine is in the southeastern part of the county and is the only one in the locality. The country rock formation of basalt is here thin, and a porphyry dike carries the pay rock which has made a mine said to be worth a half million dollars. The present owners in possession, C. M. Cartwright & Co., have been operating the mine for two years past, spending, it is said, about $50,000. They have blocked an ore body 8 feet thick, carrying gold, silver and copper values that average $150 to the ton. A Mr. Brown is contesting for the mine on the ground of prior location.

SOUTH DAKOTA.

PENNINGTON COUNTY.

The Belt Dev. Co., at Deadwood, is down 300 feet in the main three-compartment shaft and sinking is advanced at the rate of 4 feet a day. Within six months it is expected to complete 800 feet depth, which will be the fastest shaft-sinking time made in the Black Hills.——The Hidden Fortune Co. has planned to invest upwards of a million dollars in development work and mills, and by the end of the year the district will furnish work for an additional population of 2000.

UTAH.

BOX ELDER COUNTY.

The Evanston M. & M. Co. has incorporated; capital $50,000. J. Williams is president, and H. B. Stratford secretary. The company owns the Superior and other mining claims in the Promontory mining district.

The Burton M. Co. has incorporated; capital $20,000. E. F. Squires is president, and J. W. Smith secretary and treasurer. The company owns the Blue Ribbon group in Park valley.

JUAB COUNTY.

Prof. C. Butters believes the low-grade siliceous gold ores of Tintic can be treated profitably. The owners of some of the mines have tried to mill the low grade, but the best results have been unsatisfactory. It is said that Prof. Butters has expressed a willingness to erect a large-tonnage custom mill in the Tintic district.

UTAH COUNTY.

The Wasatch G. M. Co. has incorporated, capital $5000, to develop claims 3 miles east of Ogden. C. A. Zimmerman is president, and J. J. Brummit secretary.

The American Fork M. Co. has incorporated; capital $30,000. M. Friedel is president and L. C. Hickok secretary and treasurer. The company owns the Healey, Silver King No. 2 and Snowstorm mining claims in American Fork mining district.

WASHINGTON.

A stampede of oil land locators is being made, with the result that 120 oil land leases have been filed at Port Angeles within a few days. The property involved is located in the western part of Challam county and along the ocean beach between Lapush and Neah bay. Two companies, one headed by A. Behrens of Tacoma and the other by J. W. Young of Seattle, had previously secured by lease and purchase about 6500 acres of the land said to show the strongest prospects in seepages.

FERRY COUNTY.

Prospects in Meteor show increased values as greater depth is attained. A recent assay on the Montana, owned by Pea & Co., gave over 1600 ounces silver and $21.70 gold.——The Horseshoe and the Good Luck, owned by Millikan & Campbell, shows better in the shaft. The ore taken out carries bromides and assays over $200 in silver and gold.——On the Stray Dog and the White Swan work is being pushed with two shifts.——A small fraction called the Ireland, lying close to the northwest corner of the Meteor, sold first for $25, inside of a week it sold again for $300, and the present owners have refused $1500 for it.——The townsite on Nez Perce creek, about 1 mile southwest from the Meteor, has been named Sylvanite by the promoter, L. Finnegan, formerly of Republic. Northwest of the Meteor mine is another townsite, located by Reddin & Wilson of Rossland, and named Meteor.——A party of Colville men have employed surveyors, armed with revolvers, to survey around the leading properties for fractions. They have a triangular fraction lying between the side lines of the Meteor and the Alamo, for which they ask only $50,000.

Supt. W. H. Kells of the Trade Dollar, at Republic, says the two-compartment shaft is down 120 feet and the ledge has been cut.

The placers near Republic continue to pay well. Considerable difficulty of working is encountered from the light fall of the drainage and depth to bedrock, influx of water on the latter being controlled with difficulty under present working conditions without machinery.

The Cold Spring group in Meteor has been sold by B. Stensger and W. P. Foster to J. H. Young, O. J. Smith, E. M. Hodgson, B. C. Gregory, C. C. Caruthers, A. J. Lee and W. B. Dingle, all of Colville, for $10,000. The new owners will sink a shaft 200 feet.

The Republic & Grand Forks R. R. Co., a corporation independent of the other railroad systems of Washington and British Columbia, has just let a contract for the immediate construction of the road bed and track from Grand Forks, B. C., to Republic, Wash., to G. S. Deeks & Co. The road will be about 46 miles long and the contract calls for completion ready for equipment Nov. 1 of this year. Men have commenced clearing the right of way and it is expected 1000 men will be at work by July 1 and 2000 by Aug. 1. T. W. Holland is the general manager, secretary and treasurer of the road, with headquarters at Grand Forks, and W. E. Morris of Republic is assistant manager and general counsel. The company have two-year contracts for ore transportation from many Republic companies and for smelting. They propose to build a 500-ton smelter at Grand Forks at once.

JEFFERSON COUNTY.

G. White of Illinois and L. Baumgarten and J. Gallagher of Chicago have been exploring in the Olympic mountains since March. They brought out samples of coal and copper, but would give out no information, and have returned to Chicago. It is said they will organize a company to develop their discoveries.

OKANOGAN COUNTY.

Placer gold has been found in paying quantities in the gulches and creek bars at Loomis. It is claimed that 75 cents was obtained from one pan and the ground is being carefully prospected.

STEVENS COUNTY.

Work is progressing on the Silver Knight, 15 miles southeast of Northport, on the North Fork of Deep creek, and a large body of low-grade copper-gold ore lies at the bottom of the 60-foot shaft. L. L. Tower, an owner in the claim, says that the Silver Knight has the largest body of low-grade ore to be found this side of Rossland. At present seven men are employed sinking a 100-foot shaft.

WYOMING.

CARBON COUNTY.

A strike of copper has been made on the eastern slope of the Sierra Madre mountains, near Saratoga. H. F. Forrest says that the discovery is a copper-bearing vein running a little south of east for miles and estimated to be more than 40 feet wide. Several claims are located and have been worked for some time. The Black Diamond, the Syndicate, the Octavia and the Cuprite are located on this vein, and all show good bodies of ore.

FOREIGN.

BRITISH COLUMBIA.

The Ben d'Or mines, situated on Cadwallader creek, about 70 miles from Lillooet, are reported sold to New York people for $750,000 on an eighteen months' working bond, first payment, $125,000, on June 25. The Ben d'Or has shipped bullion regularly. Recent development work shows large bodies of free milling gold ore.

The Old Gold, Lardeau, is to be opened up by J. W. Westfall of Trout Lake.

Free milling gold ore is being found at a number of points in Lardeau district. The Eva group is located in this free gold belt and until the Eva was proven there was little prospecting done for free gold.

The tunnel on the Highlander mine, Ainsworth, has entered the vein at a depth of 900 feet.

The tunnel on the Estella and Rover in the East Kootenay is now in between 600 and 700 feet. At 260 feet a crosscut shows 12 feet of ore. A second crosscut has 11 feet of ore and a third has about 7 feet. Stoping has been commenced.

Nelson, June 6, 1901.

A rich strike on the Wyoming mine at Sandon, operated by the Ruth M. Co., an English organization, is reported. The ore is silver-lead, assaying very high.

A strike of placer gold has been made in Franklin camp, not far from Grand Forks. The strike was made by J. W. Bartlett and C. H. McDonald, who own a ranch there. The gold was found while digging a post hole on the banks of Franklin creek. They noticed that the gravel carried gold and panned out several dollars' worth of dust, which is coarse and sharp, showing that it had not traveled far.

After long idleness the Fisher Maiden at Silverton is again under development, under the direction of J. K. Clark. W. W. Greenwood and F. Watson are much pleased with the prospects. The former states that they recently made a shipment of two tons to Montana smelters, with satisfactory results.

The American government boundary line surveyor, Mr. Sinclair, determining the line in the Mt. Baker district, found it 3840 feet farther south than had been supposed. Two thousand feet of two of the most valuable mines in the district—the Golden Chariot and the Golden Star—owned by Seattle and New York people, were determined to be in Canada. Canadians jumped all this ground, claiming it had not been staked according to Canadian regulations and was not recorded. Americans assert that the claims were relocated under Canadian law when the question of boundary first came up.

According to the official report of Bernard McDonald, the Rossland manager of the Le Roi, the shipments for April averaged $12.76 a ton, an increase of $2.40 a ton over the values for March. On the estimated cost of $10.32 per ton for mining and treatment the profit would be $2.44 a ton, and on 21,066 tons shipped it would be approximately $51,401.04. The shipments of the several mines managed by B. McDonald for April were: Le Roi, 21,066 tons, yielding 8252 ounces gold, 14,205 ounces, silver, 261 tons copper, of a total estimated value of $268,830. Rossland Great Western returns from ore shipped during developments to date were 3461 tons, yielding 1071 ounces gold, 2706 ounces silver, 54 tons copper, of a value of $55,690. Le Roi No. 2 shipped 4469 tons, yielding 1798 ounces gold, 6389 ounces silver, 98 tons copper, valued at $74,670. The average value of Rossland Great Western ore since shipments were commenced has been about $16.10. The average value of Le Roi No. 2 shipments for April were about $16.75.

MEXICO.

In the Prieto mine of La Dura M. Co., at La Concentracion, across the Yaqui river, in the northwest corner of the Alamos district, a body of very rich ore has been developed in the bottom of the mine. To develop and work it a new three-compartmetn shaft will be sunk to a depth of 1200 feet. G. Sincox and F. Lesher have gone out from Minas Prietas to contract the work of sinking.

The Richfield M. Co., J. A. Cooper manager, have bought the Nacimiento and La Llave claims, near Tuape, Sonora. Men have been put on development work, and a mill will be erected to reduce the ores.

It is reported that the Los Bronces coal fields, Sonora, have been sold to an English syndicate for $125,000, gold. Nacosari people are said to be interested, and the road now building out to Nacosari will be extended to Los Bronces to supply the reduction works of the Moctezuma Copper Co. with fuel.

THE KLONDIKE.

F. Berry and T. Lloyd are said to have an option on J. Hall's half interest in No. 17 El Dorado. The provision is made that the option is not to be taken advantage of until after the present cleanup. Mr. Lloyd is manager of Mr. Hall's interest in No. 17, which is owned jointly by Mr. Hall and N. E. Picotte.

The long-brewing war against concessions in the Klondike has opened against the big grants. Suit has been filed in the Gold Commissioner's Court against the Doyle concession on Bonanza, and against the Matson concession. A third suit is also to be brought against the Matson concession. The Bronson & Ray concession on lower Bonanza and several other concessions are to be attacked by suit.

THE TRANSVAAL.

It is reported that the British Government has decided to levy $250,000,000 on the Transvaal gold mines, to pay half the cost of the Boer war. Sir David Barbour, formerly Finance Minister for India, who was commissioned to report upon the taxable capacity of these mines, advised Colonial Secretary Chamberlain to levy $175,000,000; but Chamberlain, after consultation with Lord Milner, increased the maximum to the amount stated.

Catalogues Received.

THE Racine Boat Mfg. Co. of Racine, Wis., has issued a beautifully illustrated catalogue of the many types of vapor launches, sailboats and rowboats manufactured by them. The text information given is so attractively expressed and up-to-date that it will make at least a fresh water sailor out of the most timid landsman. Mining in southeastern Alaska is very largely a matter of boat transportation, and it is certainly worth the while of any intending prospector to have the information this catalogue gives. It can be obtained either by writing to the head office or to Baker & Hamilton, Pacific Coast agents, San Francisco, Cal.

THE Rockwell Engineering Co. of 26 Cortlandt St., New York, has issued Catalogue B, "Fuel Oil for Boilers." It has 16 large pages of illustrations and explanatory text devoted to the special appliances manufactured by that company for the use of petroleum fuel. The catalogue, which can be obtained by writing to the company, will answer many questions that will suggest themselves to the operators of steam plants considering the change from coal to petroleum fuel.

Personal.

LOUIS C. KELSEY has been elected city engineer of Salt Lake City, Utah.

C. L. CRANE has been appointed Supt. Reno Star mine, Bryan City, Nev.

HOWARD WELCH has been appointed mine inspector of coal mines of Montana.

RICHARD H. PARKER of Boston, Mass., was in San Francisco a few days last week.

HENRY B. KAEDING is chemist for the Oriental Con. M. Co., at Tai Bawoie, Korea.

F. L. SIZER, M. E., is manager Rosario Mines, Ltd., of Guadalupe y Calvo, Sonora, Mexico.

C. H. KAYSER has been examining mines in Lander and Nye counties, Nev., for Eastern people.

H. VINCENT WALLACE of Bakersfield, Cal., is at Altar, Sonora, Mexico, as Asst. Supt. Veta Grande M. Co.

M. M. O'SHAUGHNESSY, consulting engineer, of San Francisco has gone to Honolulu on a short professional visit.

H. H. NEWBY of San Francisco has resigned as Supt. of construction of the Bimetallac dam, at Georgetown Flats, Mont.

THEO. F. VAN WAGENEN of Denver, Colo. is engaged in extended mine examinations in the vicinity of Lovelocks, Nev.

A. HAUMAN, M. E., will shortly return to San Francisco from a professional stay of some months at Las Animas, Sonora, Mexico.

J. H. STRITE, late of Redding, Cal., is in charge of construction of a large concentration plant for the Irondale Lead Co. at Irondale, Mo.

J. D. HELM, manager of Guggenheim smelters in the State of Chihuahua, Mexico, has been sojourning in San Francisco for several days.

EUGENE BIDDESON of Pueblo, Colo., has accepted the superintendency of the Arizona & Sonora Mfg. Co., who are erecting a plant at Nogales, Ariz.

Recently Declared Mining Dividends.

	Payable.
Modoc G. M. Co., Colorado, 1 cent per share	June 13
Kennedy G. M. Co., California, 5 cents per share, $5000	June 6
Central-Eureka G. M. Co., California, 2½ cents per share, $10,000	June 13
Con. Cal. & Virginia, Nevada, monthly 10 cents per share, $21,600	June 14
Dewey Mill, Utah, $10,000	June 10
Pointer G. M. Co., Colo., quarterly, 1 cent per share, $12,500	June 21
New Home M. Co., Colo., monthly, $12,500	June 20
Central Lead Co., Mo., monthly, 50 cents per share, $5000	June 15
Elkton G. M. Co., Colo., quarterly, 3 cents per share, $75,000	June 20
Empire-State M. Co., Idaho, monthly, 10 cents per share, $50,544	June 15
Doctor-Jack Pot G. M. Co., Colo., 1 cent per share, $29,000	June 28
La Fortuna G. M. Co., Ariz., monthly, 5 cents per share, $12,500	June 10
Smuggler G. M. Co., Colo., monthly, 3 cents per share, $30,000	June 15
Standard Oil Co., quarterly, $12 per share, $12,000,000	June 15
St. Joseph Lead Co., Mo., quarterly, 15 cents per share, $37,500	June 20

Commercial Paragraphs.

THE Ludlow-Saylor Wire Co. of St. Louis, Mo., has filed an application for an increase of its capital stock from $100,000 to $300,000. The assets of the company are $425,004.80 and its liabilities $95,671.99.

H. D. CRIPPEN, manufacturer, of 52 Broadway, N. Y., has recently made export shipments of twelve Jackson hand power rock drills to a mining company at Chimbote, Peru, five to Mexico and four to Japan.

THE city of Boise, Idaho, has expended $100,000 for improvements, including paving, sewer system and other work. The work has proceeded under the directions of City Engineer E. G. Eagleson.

Latest Market Reports.

SAN FRANCISCO, June 13, 1901.

SILVER—Per oz., Troy: London, 27 7-16d (standard ounce, 925 fine); New York, bar silver, 59⅝c (1000 fine); San Francisco, 59⅜c; Mexican dollars, 50c San Francisco, 47½c New York.

COPPER.—New York: Lake, 1 to 3 casks, $17.25; carload lots, $17.00; Electrolytic, 1 to 3 casks, $16.75; carload lots, $16.62½; Casting, 1 to 3 casks, $16.60; carload lots, 16.50. San Francisco: 18. Mill copper plates, 20c; bars, 22@23c. London: £69 5s per ton.

The points of note as affecting the future are first that the demand and stocks have both diminished in Europe, and export sales at New York have shaded electrolytic from ¼ to ½ cent below open quotations. The European conditions cannot be regarded as permanent. Increase of consumption is inevitable and stocks must be accumulated to supply it Consumption in the United States is absorbing very much larger amounts and the indications are that it will continue to increase. These features of the market, the consumption that is prospective, makes toward the maintenance of prices.

On the other hand, a very considerable increase in the production is in sight from the Lakes, from Arizona and from Mexico, particularly this last. In the Lakes district increased treatment facilities have been created in the two years past of continued high prices. In Arizona and Mexico new mines have been created. The raw material copper ore has been developed and the copper is beginning to come on the market, and it will come in increasing quantities. A considerable drop in prices will not affect its coming in constantly increasing quantities.

The market of the future is the balance of the two sets of conditions. The opinion of European consumers is evidenced by their abnormally slackened demand and consumption of local stocks in sight.

The opinion of the Calumet & Hecla people, the owners of some of the new mines in Mexico and of the richest and oldest producing Lake mines, may be inferred from the persistence with which they have cleared their yards of stocks, and the recent move in temporarily closing the mining on the amygdaloid veins till their new mill is ready. The published explanation is economy, and it is possible that the Calumet & Hecla needs to economize. But the conglomerate veins of the Calumet & Hecla yield a higher percentage of copper than the amygdaloid, and they have not been closed down. It is conceivable that the economy of the Calumet & Hecla consists in getting all the copper possible on the market by using their existing crushing plant wholly on the conglomerate ore, while the price is sustained by other people and before increasing supplies from everywhere force the price down. If the acts of producers who are in a position to know have significance it would seem as if the price could not be kept up much longer.

The Amalgamated Copper Co. expansion by inclusion of the Boston & Montana and Butte & Boston are changes of name and capitalizations of profits merely. The people who organized the Amalgamated have been the holders of the other stocks, having bought them when copper was low and the stocks were low. The original shares of the Amalgamated cost par in cash. The sales to themselves give to the capitalized profits an equality with the cash paid for the original shares. By no manner of means can the transaction affect the price of copper in the future, however. It is purely a stock matter. The business action of the Calumet & Hecla people is distinctly a matter which does affect copper prices and consumers should take it into account.

LEAD.—New York, $4.37½; Salt Lake City, $4.00; St. Louis, $4.32½; San Francisco $4.90, carload lots; 5½c 1000 to 4000 lbs.; pipe 6, sheet 6½, bar 5½c; pig, $5.25. London, £12 8s 9d per ton=2.70 cents per lb.

SPELTER. — New York, $4.20; St. Louis, $3.75; London, £16 2s 6d per ton =3.58½ cts. per lb; San Francisco, ton lots, 5½c; 100-lb lots, 6c.

ANTIMONY.—New York, Cookson's, 10c; Hallett's, 9c; San Francisco, 1000-lb. lots, 10c; 300 to 500 lbs., 11c; 100-lb. lots, 13@15c.

IRON.—Pittsburg, Bessemer pig, $17.25; gray forge, $16.50; San Francisco, bar, per lb., 2.65c in small quantities.

STEEL.—Bessemer billets, Pittsburg, $24; open hearth billets, $27.00; San Francisco, bar, 7c to 12c per lb.

TIN.—New York, pig, $26.00; San Francisco, ton lots, 30c; 1000 lbs., 30½c; 500 lbs., 30½c; less, 31c; bar tin, ₱ lb, 35c.

QUICKSILVER. — New York, $51.00 large lots; London, £9 2s 6d; San Francisco, local, $47.00 ₱ flask of 76½ lbs.; Export, $45.00

MAGNESIUM.—New York, $2.90 ₱ lb.; San Francisco, $3.75.

ZINC.—San Francisco, 5½c; slab, 5¾c; bar, 7c; zinc dust, N. Y., 8c.

BABBITT METAL.— San Francisco, No. 1, 10c.

SOLDER. — Half-and-half, 100-lb. lots, 19c; San Francisco, Plumbers', 100-lb. lots, 15¾c.

PHOSPHORUS. — F. o. b. New York 50@60c ₱ lb.

ASSAY LITHARGE.—San Francisco, 10c ₱ lb, small lots.

BISMUTH.—New York, ₱ lb., $2.25 50-lb lots; San Francisco, $2.50 to $2.75 ₱ lots.

PLATINUM.—San Francisco, crude, $22 ₱ oz.; New York, $22 per Troy oz

FERRO-MANGANESE. — Pittsburg, 80%, domestic, $62.50, large lots.

ALUMINUM.—New York, No. 1, 99% pure ingots, 35c; No. 2, 90%, 30c to 35c.

FERRO-TUNGSTEN. — New York, 37%, 32c; San Francisco, 65c (60%).

NICKEL.—New York, 50@60c ₱ lb.

POWDER.—F. o. b. San Francisco: No. 1. 70% nitro-glycerine, per lb., in carload lots, 15½c; less than one ton, 17½c. No. 1*, 60%, carload lots, 13½c; less than one ton, 15½c. No. 1** 50%, carload lots, 11¾c; less than one ton, 13¾c. No. 2, 40%, carload lots, 10c; less than one ton, 12c. No. 2* 35%, carload lots, 9½c; less than one ton, 11½c. No. 2** 30% carload lots, 9c; less than one ton, 11c. Black blasting powder in carload lots, minimum car 728 kegs, $1.50 per keg; less car lots, $2 per keg.

CAPS.—3x, $5.50 per 1000; 4x, $6.50; 5x, $8; Lion, $9, in lots not less than 1000.

FUSE.—Triple tape, $3.60 per 1000 feet; double tape, $3.00; single tape, $2.65; Hemp, $2.10; Cement No. 2, $3.00; Cement No. 1, $2.65, in lots of 3000 feet and up.

CANDLES.—Granite 6s, 16 oz., 40s., 10¾c ₱ set; 14 oz., 40s., 9¾c.

OILS.—Linseed, pure, boiled, bbl., 75c; cs., 80c; raw, bbl., 73c; cs., 78c. Deodorized Stove Gasoline, bulk, 14½c; do., cs., 20½c; 86° Gasoline, bulk, 20c; do., cs., 26c; 63° Naphtha or Benzine, deodorized, in bulk, per gal., 13½c; do., in cs., 19½c; Lard Oil, Extra Winter Strained, bbl., 75c; cs., 80c; No. 1 bbl., 50c; cs., 55c. Neatsfoot Oil, coopers' bbls., 60c; cs., 65c; No. 1 bbl., 50@52½c; cs., 55@57½c.

An Enterprising Company.

All visitors to the Pan-American Exposition interested in pipe wrenches should not overlook the exhibit of the Atlas Pipe Wrench Co. of New York and San Francisco, section 34, Machinery Building. A photograph of the exhibit appears on this page. All sizes of the "Atlas" are on exhibition, and attendants are constantly on hand to demonstrate the superiority of the tool. From the number of orders for wrenches received from every section of this country and Europe the Atlas' popularity appears to be well established. *

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Woodbury, Geo. E. ..... —

Y

Yawger, I. C. 7
Yuba Con. Gold Mining Co. 20

New Patents.

DEWEY, STRONG & CO.'S SCIENTIFIC PRESS PATENT AGENCY, 330 Market St., S. F., has official reports of the following U. S. patents issued to Pacific coast inventors:

FOR WEEK ENDING JUNE 4, 1901.

675,806.—TYPEWRITER—J. F. Ames, Portland, Ogn.
675,583.—MINING MACHINE—F. Auser, S. F.
675,436.—LEDGER INDEX—V. C. Brock, Wasco, Ogn.
675,507.—SOLDERING MACHINE—W. S. Case, Haywards, Cal.
675,508.—FLOATING FISH TRAP—G. Dean, Samish, Wash.
675,440.—SASH PULL—H. W. Downing, Oakland, Cal.
675,872.—QUARTZ MILL—A. Ford, Golden Gate, Cal.
675,479.—THREAD HOLDER—Stella W. Hart, Los Angeles, Cal.
675,598.—CHURN—A. Haworth, Hillsboro, Ogn.
675,481.—SACKING DEVICE—C. F. & A. C. Jacobson, Berkeley, Cal.
675,490.—ROCK DRILL—C. T. Litchfield, Spokane, Wash.
675,514.—GOLD SAVING APPARATUS—A. W. Lockhart, S. F.
675,515.—BAND CUTTER—C. A. Long, Pomeroy, Wash.
675,491.—FLUSHING TANK—Thos. Mann, Portland, Ogn.
675,521.—ROTARY ENGINE—J. D. McFarland Jr, S. F.
675,756.—CIGAR—M. Reinstein, Portland, Ogn.
675,792.—PENHOLDER—F. Rench, Colton, Cal.
675,644.—STEERING DEVICE FOR MOTORS—A. C. Stewart, Santa Paula, Cal.
675,503.—SPIRIT LEVEL—C. M. Verrill, Oakland, Cal.
34,631.—DESIGN—H. P. Koster, Los Angeles, Cal.
34,602.—DESIGN—M. Reinstein, Portland, Ogn.

Notices of Recent Patents.

Among the patents recently obtained through Dewey, Strong & Co.'s SCIENTIFIC PRESS U. S. and Foreign Patent Agency, the following are worthy of special mention:

SPIRIT LEVEL.—No. 675,503. June 4, 1901. C. M. Verrill, Oakland, Cal. This invention relates to improvements in spirit levels, and it consists of a sleeve having holes at opposite sides of its periphery, exterior cap pieces into which the ends of the tube extend and are secured, a circular flange is formed at right angles with one end of the sleeve, a body having a hole bored therethrough and a countersink to receive the sleeve and its flange, and conical counterbores formed axially with the sleeve from opposite sides of the body, with similarly shaped disks fitting the counterbores having short flanges extending into the ends of the sleeve.

FLUSHING TANK.—No. 675,491. June 4, 1901. T. Mann, Portland, Or. This invention relates to an improved tilting flushing tank. It consists of one tank contained and pivoted within the other, means by which the exterior tank may be tipped and discharged of its contents, and automatically righted and filled.

ROTARY ENGINE.—No. 675,521. June 4, 1901. J. D. McFarland Jr., assignor of one-half to J. Bruckman, both of San Francisco, Cal. The device consists of a wheel having a closed disk forming one side, a series of radially disposed cylinders cast integral therewith and bored out, pistons movable in the cylinders, bent or crank-shaped piston rods, one arm of which extends through the cylinder and connects with the piston, and the other lying parallel therewith but outside of the cylinder connects with the crank by means of an intermediate connecting rod or pitman. In connection with this are ports connecting with the opposite ends of the cylinders and valves movable over the ports so as to alternately admit and exhaust the impelling medium from the cylinder.

CAN SOLDERING APPARATUS.—No. 675,507. June 4, 1901. W. S. Case, Haywards, Cal. This invention is applied to the soldering of the end seams of rectangular cans having a greater dimension in one direction than the other, and it comprises a mechanism by which the cans are delivered from the feed or supply chute to holders adapted to receive and carry the cans, and by which the cans are transferred so that the edges will be successively dipped into the solder bath and remain a sufficient length of time, and mechanism by which the cans are rotated at stated intervals so that each edge is submerged in the solder while the can is passing the length of the bath. Endless traveling chains carry the can holders and move them successively over the solder bath.

SACKING DEVICE.—No. 675,481. June 4, 1901. C. F. and A. C. Jacobson, Berkeley, Cal. This apparatus is designed to hold sacks while they are being filled. It includes a base, a vertical standard, a frame guided on the standard and composed of divergent bars, a support for the frame, rock shafts parallel with the divergent frame bars, pins guided thereon and connections between the pins and the rock shaft, and means by which the rock shafts operate in unison, and means for locking the shaft in one direction and a counterweight for moving them in the opposite direction.

GOLD SAVING APPARATUS.—No. 675,514. June 4, 1901. A. W. Lockhart, San Francisco, Cal. This invention is designed to separate gold from gravel and pulp with which it may be associated. It consists of an enclosed, inclined riffled sluice through which the gravel and water are forced to travel upwardly and through the sluice and its extensions, an endless chain conveyor or excavator operating in relation to the position of the sluice, a support for the mechanism and means for adjusting and operating the various parts thereof.

TYPEWRITING MACHINES.—No. 675,806. June 4, 1901. J. F. Ames, Portland, Or. This invention consists of the formation of certain words which are most often used in the construction of sentences upon blocks or bodies which carry the whole word and in the union of a plurality of such words upon one block, with means to bring either word into the line, so as to form the impression thereof when the key is struck. In conjunction with this is employed mechanism by which an additional spacing device is brought into operation, whereby the carriage is advanced a distance equal to the amount of space occupied by the word, which may be two, three, four or more letters, so that the parts will be in position for the use of the next single letter or complete word, as the sentence requires.

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WANTED.---Position as Superintendent. Eighteen years' practical experience in the West. Understand the mining and milling of ores for profit. Best of references. Address "Practical Miner," care Mining and Scientific Press.

Experienced Amalgamator WISHES POSITION. References furnished. Address V. D., care of Mining and Scientific Press.

Foreman Copper Smelter, with company smelting several hundred tons daily, would like to make a change of location. Understands every detail of the business. Address "Matte," care Mining and Scientific Press.

PRACTICAL SMELTERMAN, who had experience with sulphide and carbonate copper and lead ores in California and Mexico, competent to design or take charge of smelter, wants responsible position as chemist, furnace boss or superintendent. Address "Metallurgist," care Mining and Scientific Press.

A YOUNG MAN, having taken a course in surveying, including practical field and office work, wishes position as chainman or work in any capacity with a surveyor, civil or mining engineer. Address M. S., Box 10, Standish, Cal.

WANTED.

WANTED---FOREMAN experienced and handy about mine and mill and mining machinery. State age, experience and salary desired. Address "Quartz Mine," care of Mining and Scientific Press.

WANTED. — PROPERTIES CONTAINING MAGNETIC Pyrites or Sulphurets by parties who mean business. Address samples and particulars to Dr. Beecher, Oliver House, Corner Mason and Pine Sts., San Francisco, California.

Wanted, A Telephone Franchise in a live Western town. Anyone knowing of such a town in need of a telephone exchange will confer a favor by addressing "Telephone," care Mining and Scientific Press.

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Valuable Gold-Copper Property, 5 Miles from Callahans, Siskiyou Co., for Sale. 36 tons shipped to Selby's went 18% copper, $6 gold and silver; 136 tons shipped to Keswick went $800 copper and gold. Shaft 40 feet. Other development work. Good road. Abundant water and timber. B. K. COLLIER, Etna Mills, Cal.

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ARE YOU GOING EAST THIS SUMMER? If you are going to the Pan-American Exposition at Buffalo, or to Cincinnati, Detroit, Chicago, Milwaukee, or any point in the East, write or call upon Mr. D. W. Hitchcock, General Agent Union Pacific R. R. Co., No. 1 Montgomery St., San Francisco, in regard to reduced round trip rates to these points. Three trains via this route leave California daily. The time of the "Overland Limited" to Chicago is less than 3 days and to Buffalo 3¼ days, which is nearly a day quicker than any other line.

THE CALIFORNIA DEBRIS COMMISSION, having received applications to mine by the hydraulic process from A. Lundberg, in the Joseph Thomas Mine, at Plymouth, Amador Co., to deposit tailings in Indian Creek, and from S. I. Simmons et als., in the Victor Placer Mine, in Negro Canyon, Sierra Co., to deposit tailings in Charcoal or Negro Creek, gives notice that a meeting will be held at Room 59, Flood Building, San Francisco, Cal., on June 24, 1901, at 1:30 P. M.

WILLIETTA MINING & MILLING COMPANY.—Location of principal place of business, San Francisco, California; location of works, Tuolumne County, California.

Notice is hereby given, that at a meeting of the Board of Directors, held on the 11th day of June, 1901, an assessment (No. 1) of one (1) cent per share was levied upon the capital stock of the corporation, payable immediately in United States gold coin, to the secretary, at the office of the company, Room 8, 206 Sansome street, San Francisco, California.

Any stock upon which this assessment shall remain unpaid on the 20th day of July, 1901, will be delinquent, and advertised for sale at public auction; and unless payment is made before, will be sold on MONDAY, the 12th day of August, 1901, to pay the delinquent assessment, together with the costs of advertising and expenses of sale.

By order of the Board of Directors.

FRANK E. CORDES, Secretary.

Office—Room 8, 206 Sansome street, San Francisco, California.

SMELTER PLANS. *Drawings, Specifications, for Ore Reduction Plants.* F. D. BAKER, Mech. Engr., DENVER.

INVENTORS, Take Notice! L. PETERSON, MODEL MAKER, 544A MISSION STREET, bet. First and Second Sts., SAN FRANCISCO. Experimental machinery and all kinds of models. Tin and brasswork. All communications *strictly confidential.*

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During the past three months we have dismantled three mills: the Royal Gorge Mill, Canon City; the Oneida Reduction Works, Victor, Colo., and the Gold Brick Mill at Gunnison, Colo. The first of these was in actual operation less than thirty days; the second, ninety days, and the third one year. In all of these mills amalgamating machinery was used, and the consequence is that we have a great assortment of this class of machinery. For use it is as good as new in every respect. We are offering this machinery at a saving of from 50% to 75% over the cost of new machinery. We have:

14 Standard Amalgamating Pans.
7 8-Foot Settlers.
4 Cleanup Pans.
8 Amalgam Safes.
15 Quick Elevators.
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Howell Improved White Roasting Furnace (60x27).
3 18-Foot Revolving Ore Dryers.
1 Bruckner Roasting Furnace.
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All of these plants were fully equipped with power, including Corliss engines (18x42); tubular boilers and Heine water tube boilers; feed water heaters, and pumps.

Thousands of feet of rubber and leather belting, shafting, pulleys and hangers are in our warerooms. Write for our prices.

The air compressors we have in stock and can make immediate shipment on, are:

12½x14 Ingersoll-Sergeant.
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Quicksilver IN LOTS TO SUIT. Send for Quotations. REDINGTON & CO., 23-25-27 Second Street, SAN FRANCISCO, CAL.

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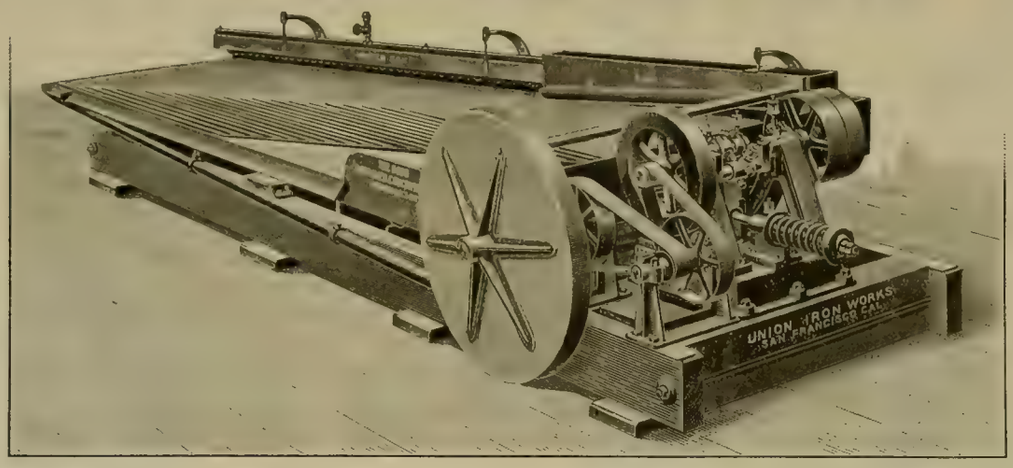

Patented Dec. 5, 1899; May 29, 1900.

THE DODD CONCENTRATING TABLE,

which we illustrate herewith, is the latest and most improved machine of this class now made.

This type of machine is so well known that little or no description is required. It is specially adapted for ores carrying a heavy percentage of sulphurets; has a large capacity and effects a clean separation.

The operating mechanism can be easily adjusted to meet the requirements of any character or condition of ore; it is simple, durable and efficient, and gives universal satisfaction.

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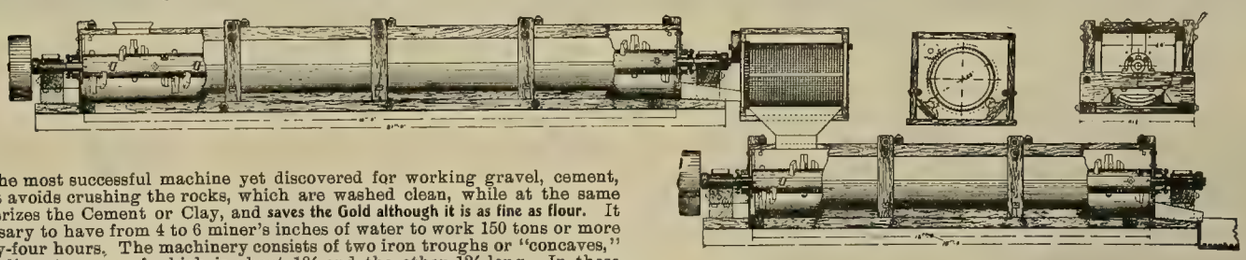


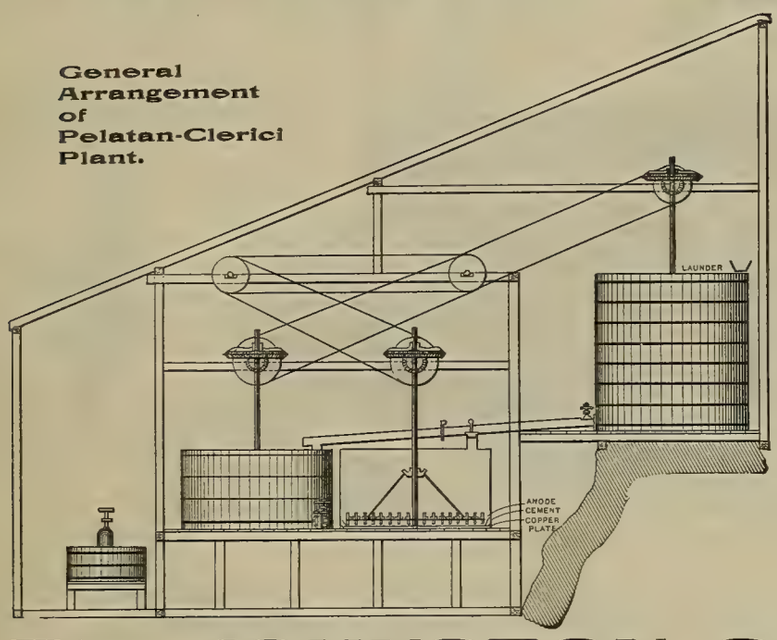
This is the most successful machine yet discovered for working gravel, cement, clay, etc. It avoids crushing the rocks, which are washed clean, while at the same time it pulverizes the Cement or Clay, and **saves the Gold although it is as fine as flour.** It is only necessary to have from 4 to 6 miner's inches of water to work 150 tons or more every twenty-four hours. The machinery consists of two iron troughs or "concaves," each 26″ in diameter, one of which is about 18′ and the other 12′ long. In these troughs are strong revolving shafts with projecting teeth, made of White Iron, 2¾″ wide by 1¼″ thick, placed in spiral form around the shaft about 2″ apart, forming a conveyor. The first shaft is geared to make from 150 to 250 revolutions per minute, and the second one from 300 to 500. There is a revolving screen between the two troughs that takes out the coarser rocks after being washed, and only the finer material runs into the second trough, and is there worked thoroughly. There is a space of about 4″ in the bottom of each trough, or "concave," that fills up with gravel and sand. When the gold is free it settles into this, and as the teeth do not disturb the bottom, the gold remains there until a cleanup is made. In many cases the 18′ machine alone is needed, as the two are only used where we have hard Cement or Clay to work. It requires from 10 to 12 H. P. to run the complete machine, and from 6 to 8 H. P. for the 18′ one alone. I also manufacture a 6′ machine about one-half the diameter of the others, and lighter in proportion, to be run by hand power, with small amount of water, and capacity of about two tons per hour. This can be easily moved from place to place.

For Testimonials and Particulars, Address : : : S. K. SNODGRASS, Denver, Colo. (The Windsor.)

THE "PELATAN-CLERICI" PROCESS

OF TREATING REFRACTORY ORES

General Arrangement of Pelatan-Clerici Plant.



Saves the precious metals by the simplest, most economical and most efficient process known. No roasting or previous treatment, except ordinary crushing. Extraction complete in from 6 to 12 hours. Extracts equally well both fine refractory gold and coarse gold in the form of amalgam. Makes a greater saving of gold than any other process from raw material at less cost. The electric current and dissolving agent promptly dissolve the precious metals, both gold and silver. Samples of ore tested free of charge. Several mills saving over 90 per cent of values by bullion returns. Simplicity. Economy. Efficiency.

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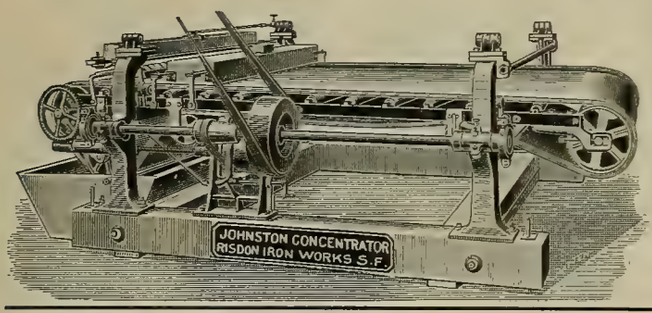
The JOHNSTON CONCENTRATOR.



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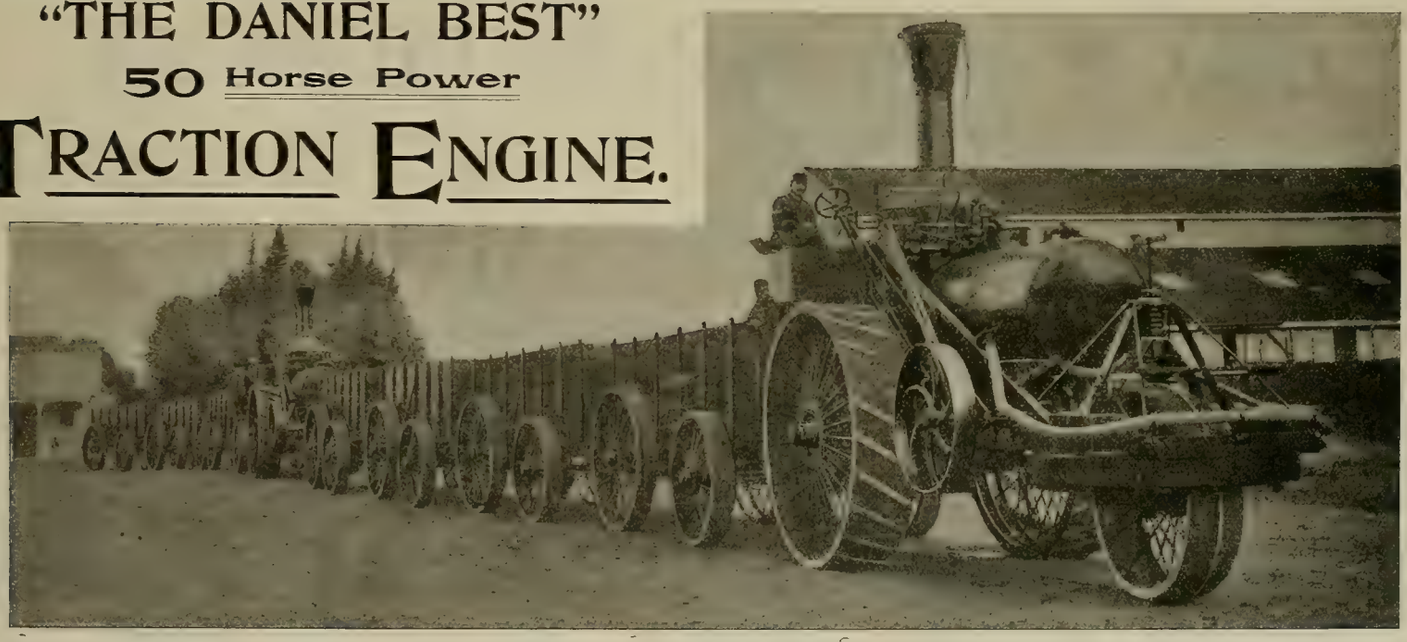

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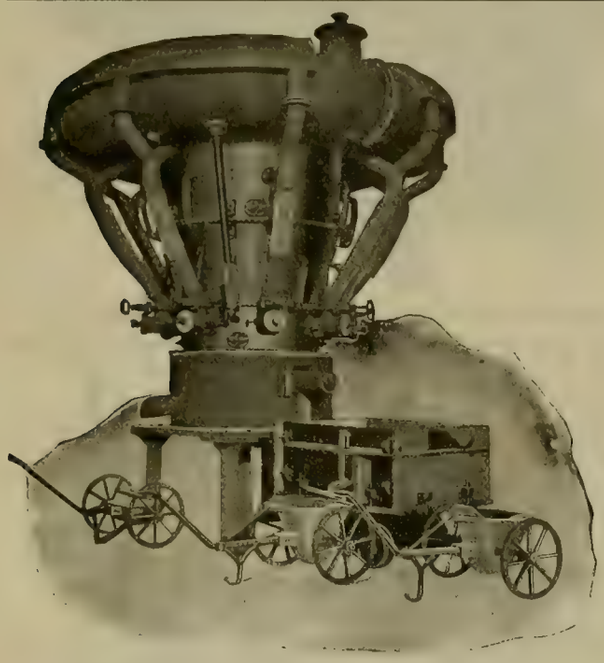

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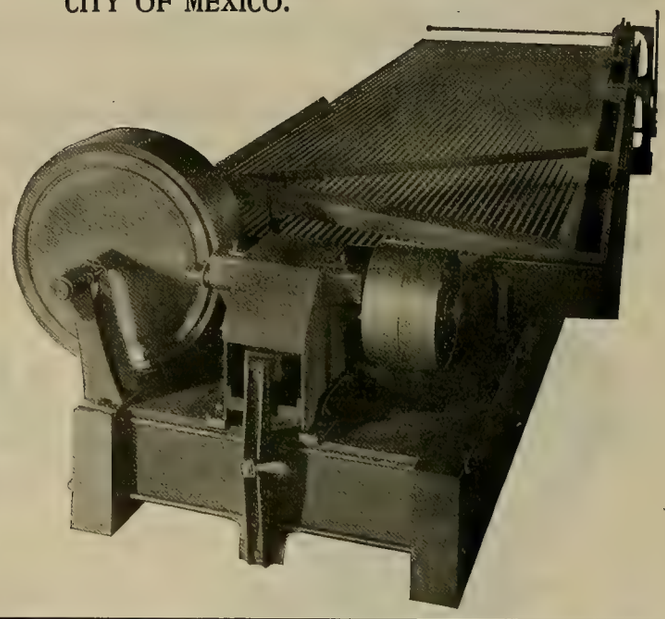

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It will make a satisfactory saving on the finest slimes or will handle pulp as coarse as 8-mesh to equal advantage.
The Wilfley Table is made only under the personal supervision of the inventor. It is built right and all possible improvements are embodied in the later machines.
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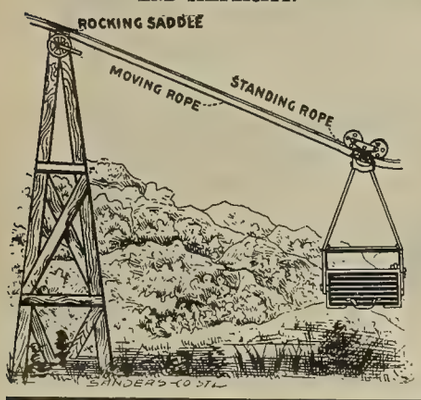

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For Conveying of Ore, Fuel, Merchandise, Etc.

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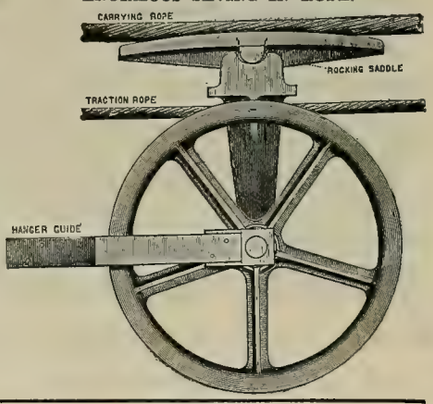

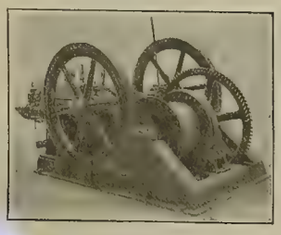

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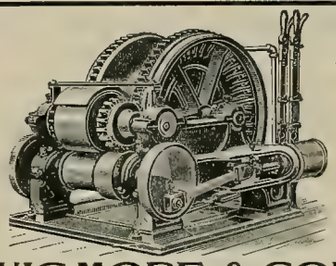

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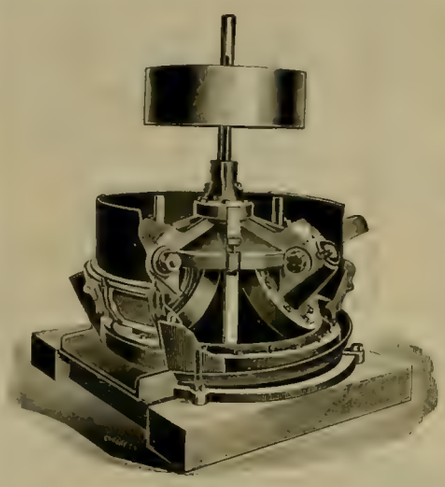

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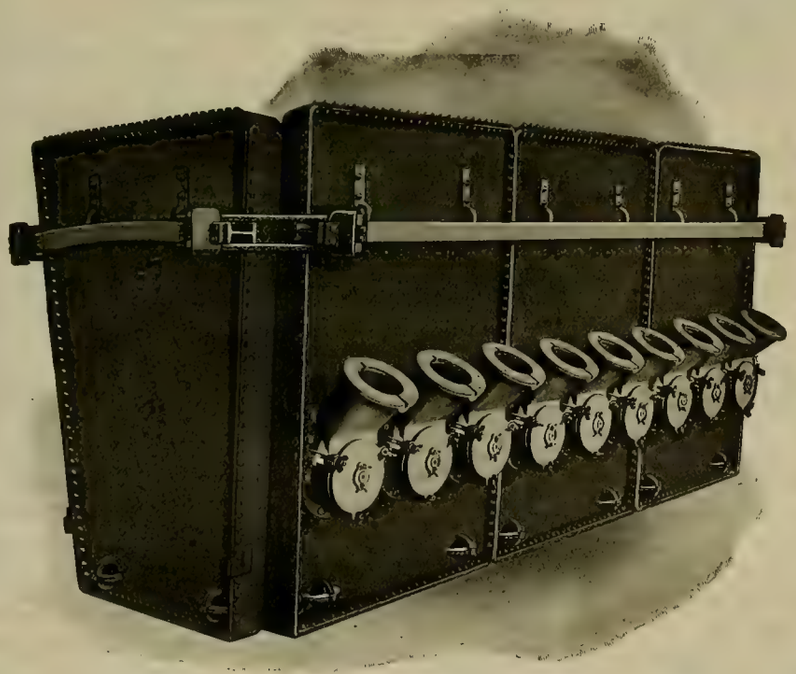

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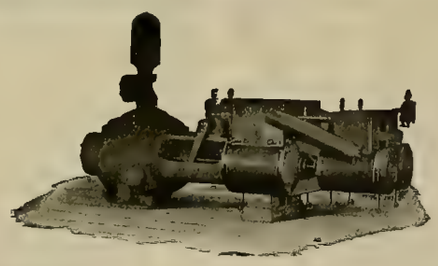

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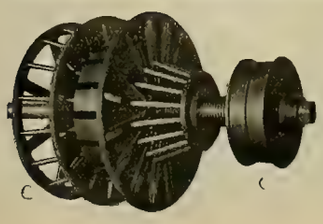

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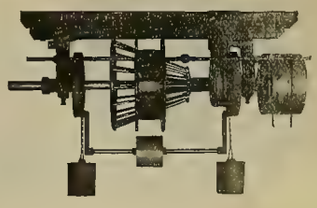

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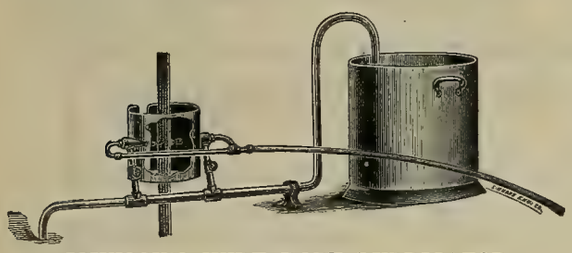

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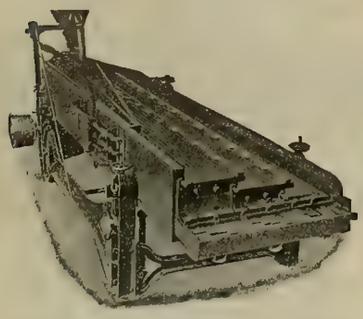

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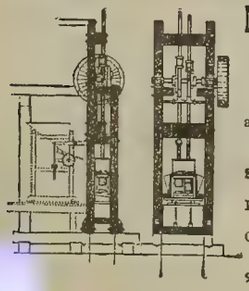

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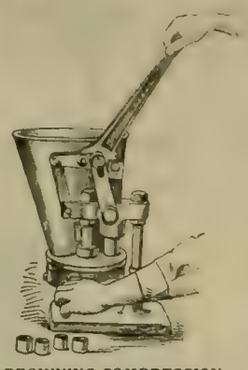

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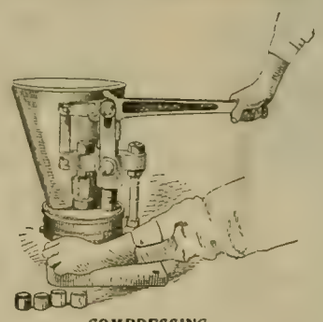

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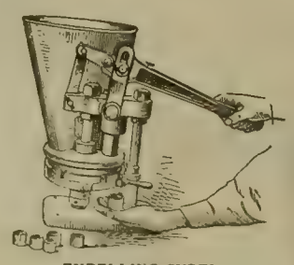

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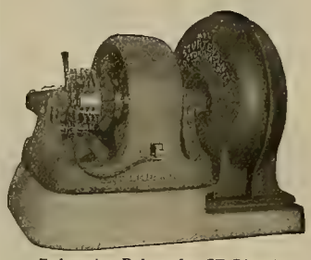

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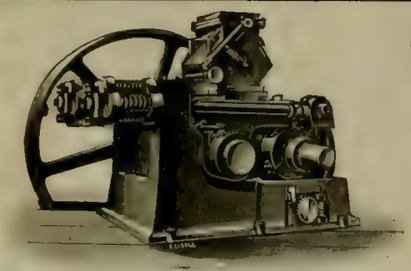

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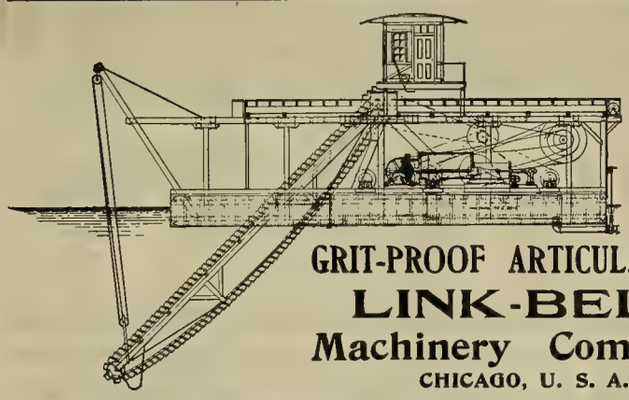

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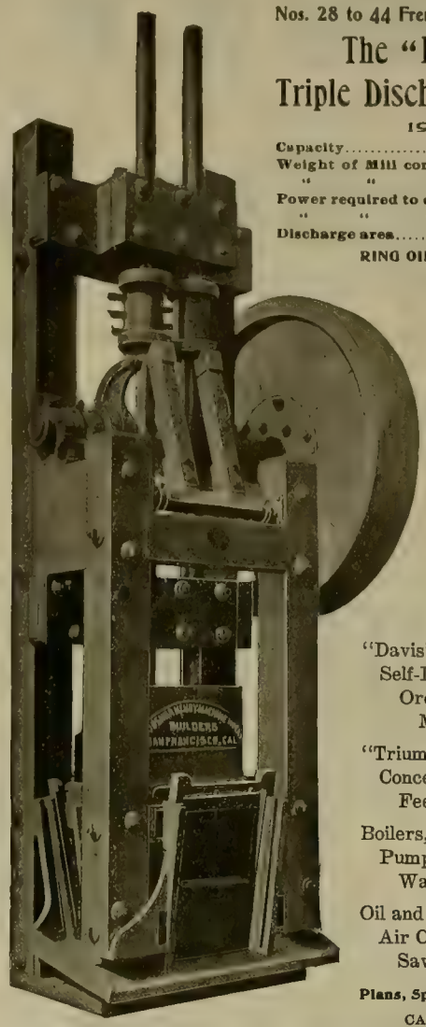

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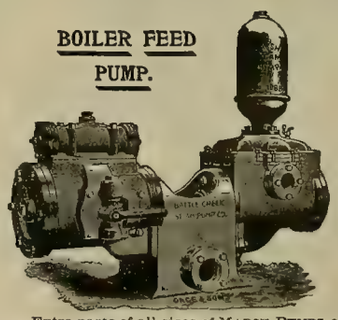

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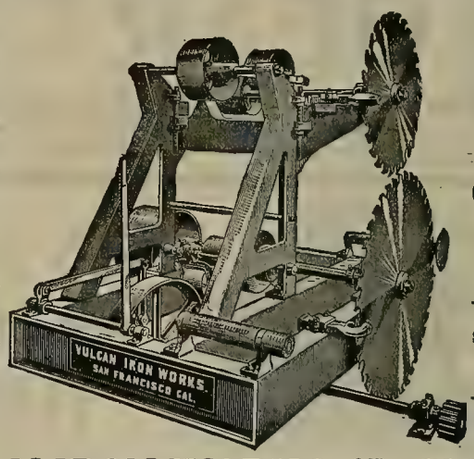

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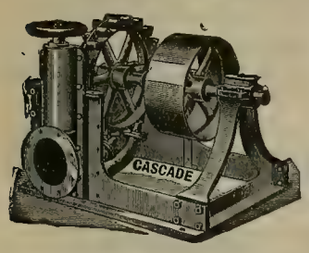

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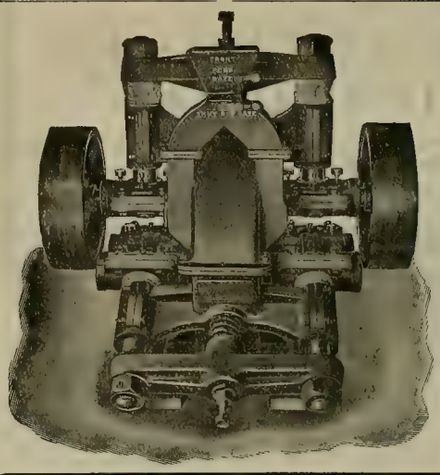

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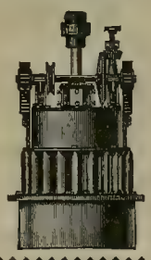

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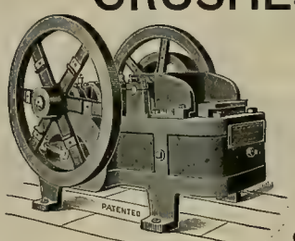

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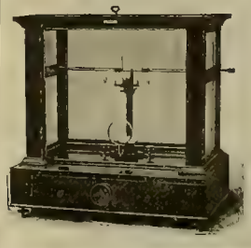

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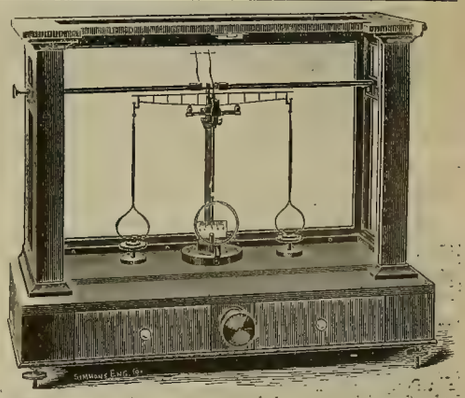

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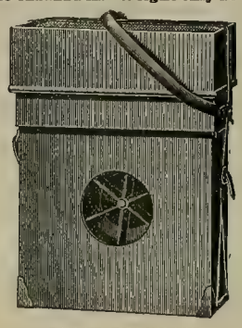

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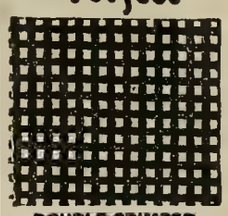

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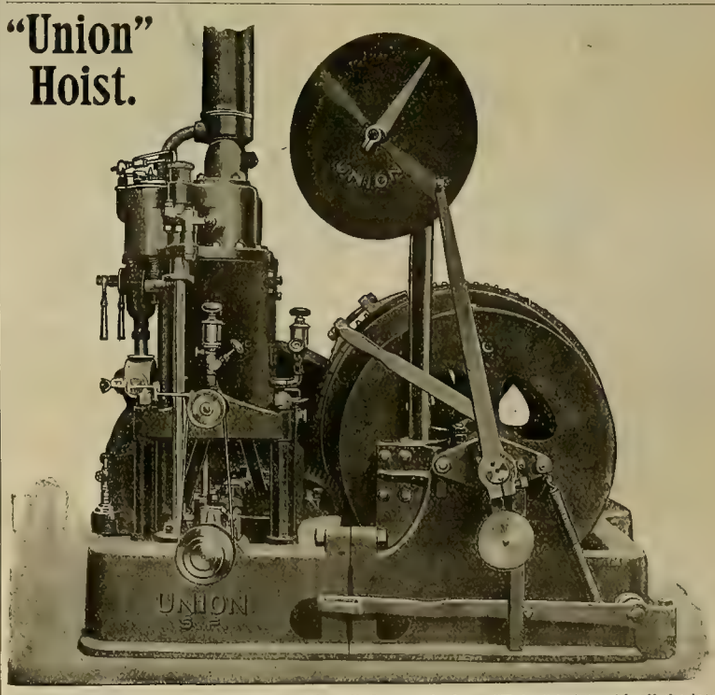

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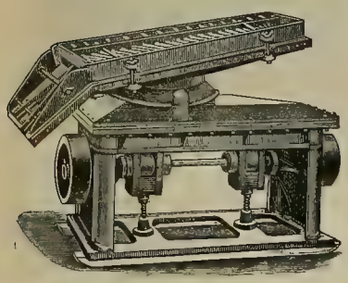

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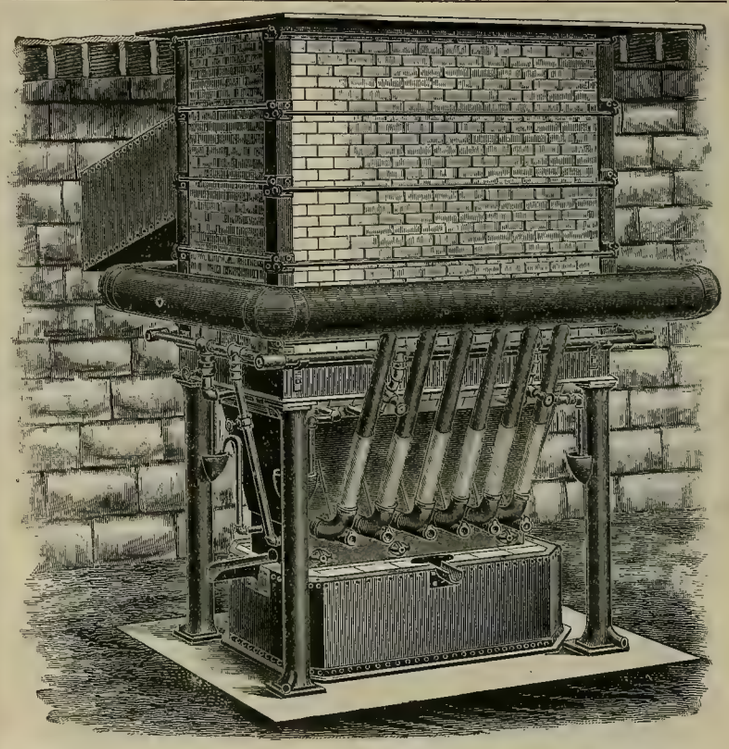

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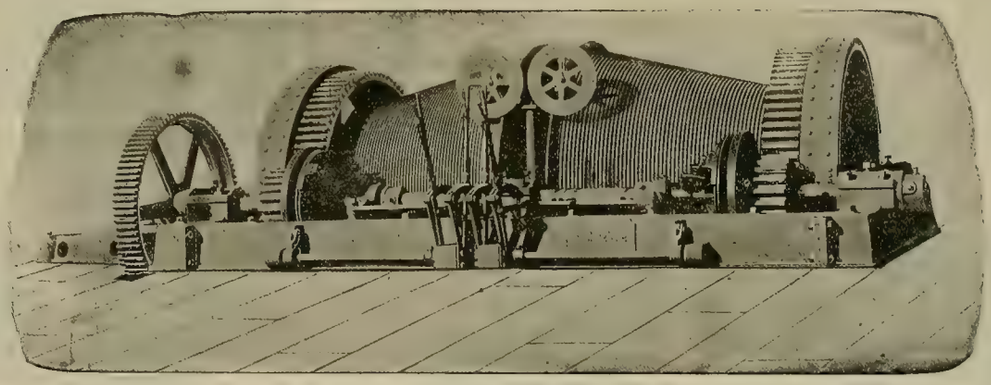

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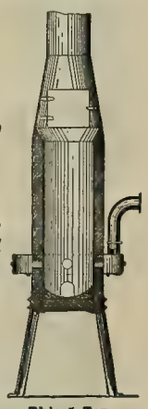

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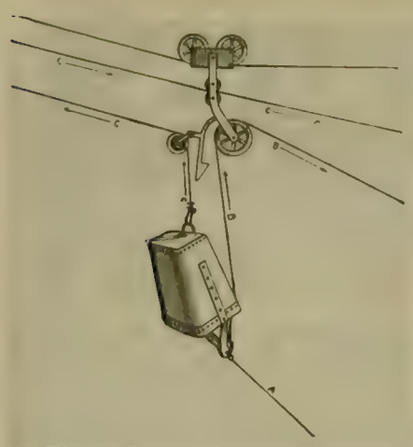

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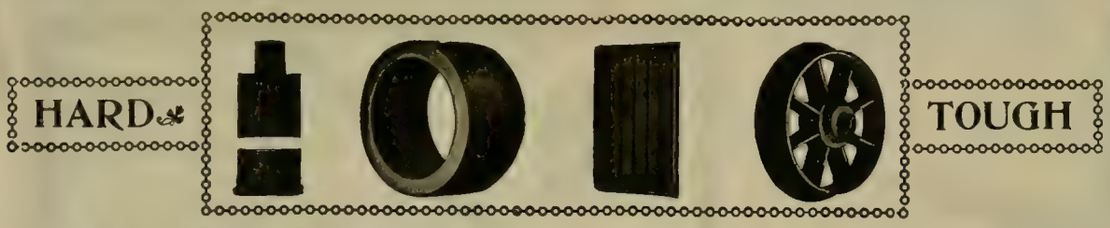

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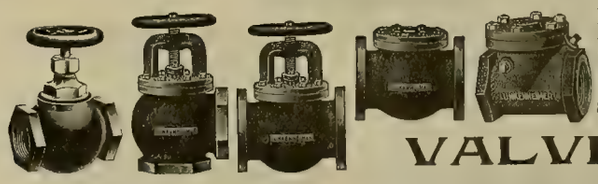

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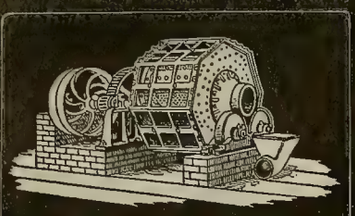

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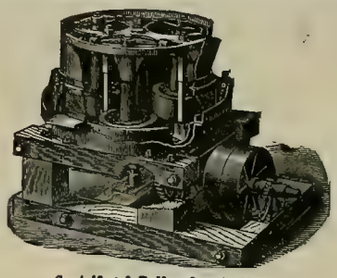

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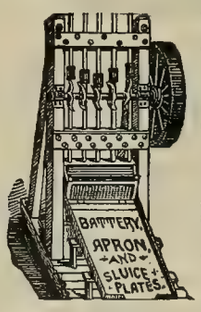

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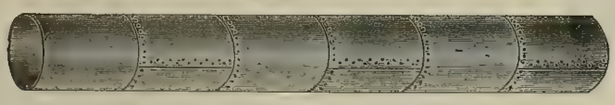

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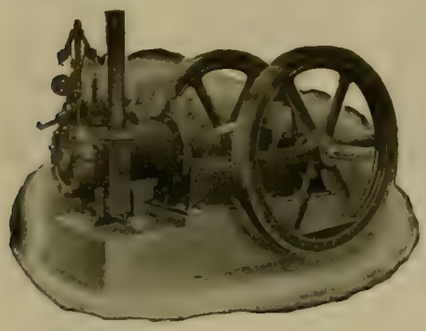

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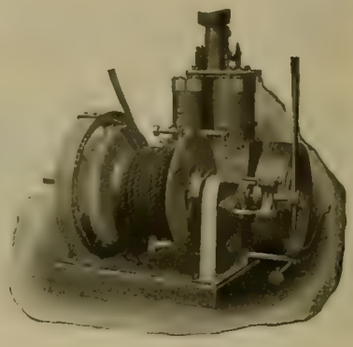

ASSESSMENT NOTICES.

MOHICAN MINING AND MILLING COMPANY.—Location of principal place of business, San Francisco, California; location of works, Tuolumne County, California.

Notice is hereby given, that at a meeting of the Board of Directors, held on the 16th day of May, 1901, an assessment (No. 1) of ten (10) cents per share was levied upon the capital stock of the corporation, payable immediately in United States gold coin, to the secretary, at the office of the company, 300 California St., San Francisco, California.

Any stock upon which this assessment shall remain unpaid on the 15th day of July, 1901, will be delinquent, and advertised for sale at public auction; and unless payment is made before, will be sold on WEDNESDAY, the 14th day of August, 1901, to pay the delinquent assessment, together with the costs of advertising and expenses of sale.

By order of the Board of Directors.

JNO. W. CLASSEN, Secretary.

Office—300 California St., San Francisco, California.

YUBA CONSOLIDATED GOLD MINING COMPANY.—Location of principal place of business, San Francisco, California; location of works, Nevada County, California.

Notice is hereby given, that at a meeting of the Board of Directors, held on the 10th day of May, 1901, an assessment (No. 1) of one (1) cent per share was levied upon the capital stock of the corporation, payable immediately in United States gold coin, to the secretary, at the office of the company, Room 801, Claus Spreckels Building, San Francisco, California.

Any stock upon which this assessment shall remain unpaid on the 25th day of June, 1901, will be delinquent and advertised for sale at public auction; and unless payment is made before, will be sold on MONDAY, the 15th day of July, 1901, to pay the delinquent assessment, together with the costs of advertising and expenses of sale.

By order of the Board of Directors.

EDWARD H. STEARNS, Secretary.

Office—Room 801, Claus Spreckels Building, San Francisco, California.

INYO MARBLE COMPANY OF CALIFORNIA.—Location of principal place of business, San Francisco, California; location of works, Inyo, Inyo County, California.

Notice is hereby given, that at a meeting of the Board of Directors, held on the 27th day of May, 1901, an assessment (No. 34) of five (5) cents per share was levied upon the capital stock of the corporation, payable immediately in United States gold coin, to the secretary, at the office of the company, room 31, tenth floor, Mills Building, San Francisco, California.

Any stock upon which this assessment shall remain unpaid on the 8th day of July, 1901, will be delinquent and advertised for sale at public auction; and unless payment is made before, will be sold on TUESDAY, the 6th day of August, 1901, to pay the delinquent assessment, together with the costs of advertising and expenses of sale.

By order of the Board of Directors.

CHARLES E. ANDERSON, Secretary.

Office—Room 31, tenth floor, Mills Building, San Francisco, California.

DELINQUENT SALE NOTICE.

OSCEOLA CONSOLIDATED MINING COMPANY.—Location of principal place of business, San Francisco, California; location of works, Plymouth, Amador County, California.

Notice.—There are delinquent upon the following described stock, on account of assessment (No. 11) levied on the 23d day of April, 1901, the several amounts set opposite the names of the respective shareholders, as follows:

Names.	No. Cert.	No. Shares.	Amt.
Pon Wand	51	250	$2 50
Pon Wand	55	250	2 50
Pon Wand	81	150	1 50
Pon Wand	87	500	5 00
Lu Chee	54	250	2 50
Jung Chee	57	250	2 50
George W. Warren	66	5,000	50 00

And in accordance with law, and an order from the Board of Directors, made on the 23d day of April, 1901, so many shares of each parcel of such stock as may be necessary, will be sold at public auction at the office of the company, 307 Montgomery street, San Francisco, California, on MONDAY, the 17th day of June, 1901, at the hour of 12 o clock M. of said day, to pay said delinquent assessment thereon, together with costs of advertising and expenses of sale.

HOLLAND SMITH, Secretary.

Office—307 Montgomery street, San Francisco, California.

DELINQUENT SALE NOTICE.

NATIONAL CONSOLIDATED MINING COMPANY.—Location of principal place of business, San Francisco, California; location of works, Rich Gulch, Shasta County, California.

Notice.—There are delinquent upon the following described stock on account of assessment (No. 14) levied on the 16th day of April, 1901, the several amounts set opposite the names of the respective shareholders, as follows:

Names.	No. Cert.	No. Shares.	Amt.
F. Strueven	163	20	1 00
T. Vogel	227	150	7 50

And in accordance with law, and an order from the Board of Directors, made on the 16th day of April, 1901, so many shares of each parcel of such stock as may be necessary will be sold at public auction at the office of the company No. 773 Mission street, San Francisco, California, on TUESDAY, the 25th day of June, 1901, at the hour of 1 o'clock P. M. of said day to pay said delinquent assessment thereon, together with costs of advertising and expenses of sale.

GEO. W. FLEISSNER, Secretary.

Office—773 Mission street, San Francisco, California.

DELINQUENT SALE NOTICE.

AMERICAN OIL AND REFINERY COMPANY.—Location of principal place of business, San Francisco, California; location of works, Contra Costa County, California.

NOTICE.—There are delinquent upon the following described stock, on account of assessment (No. 3) levied on the 26th day of March, 1901, the several amounts set opposite the names of the respective shareholders, as follows:

Names.	No. Cert.	No. Shares.	Amt.
Allen, S. L.	110	12	$ 60
Anderson, Mrs. Lulu	270	2	10
Anthony, J. C., Trustee	797	1,000	50 00
Anthony, J. C., Trustee	798	1,000	50 00
Anthony, J. C., Trustee	799	1,000	50 00
Anthony, J. C., Trustee	800	500	25 00
Anthony, J. C., Trustee	801	500	25 00
Anthony, J. C., Trustee	802	500	25 00
Anthony, J. C., Trustee	803	500	25 00
Anthony, J. C., Trustee	531	500	25 00
Anthony, J. C., Trustee	973	1,000	50 00
Anthony, J. C., Trustee	1021	4,300	215 00
Avery, Mrs. Jennie	716	5	25
Avery, Mrs. Jennie	729	5	25
Barto, Harrison	808	2,500	125 00
Barto, Harrison	812	500	25 00
Barto, Harrison	813	500	25 00
Barto, Harrison	814	500	25 00
Benecke, Diederich	93	1	05
Bgorkman, Mrs. Augusta	712	35	1 75
Brown, Mrs. Ida M	152	7	35
Buckley, Morris	788	50	2 50
Carr, H. W.	749	5	25
Conn, Mrs. Sarah A.	523	20	1 00
Conn, Mrs. S. A.	693	25	1 25
Corbiere, C. C.	564	250	12 50
Corbiere, C. C.	565	5	25
Crew, L. T.	216	2	10
Cridge, A. D.	503	1	05
Cumberson, Mrs. Maria L.	171	5	25
Donnelly, Mary M.	49	14	70
Dunlap, Mrs. W. B.	526	10	50
Donahue, Benj. S.	1141	500	25 00
Eells, Charles P.	984	2,000	100 00
Eells, Charles P.	1127	10,000	500 00
Esty, J. C.	1045	100	5 00
Estey, J. C.	1048	20	1 00
Falls, Sarah	557	40	2 00
Fetrow, Mrs Maria W.	172	3	15
Fisk, Andrew J.	366	2	10
Freese, A. J.	6	40	2 00
Freese, A. J.	7	40	2 00
Freese, A. J.	9	50	2 50
Freese, A. J.	278	10	50
Freese, A. J.	279	10	50
Freese, A. J.	280	20	1 00
Freese, A. J.	281	20	1 00
Freese, A. J.	282	20	1 00
Freese, A. J.	283	20	1 00
Freese, A. J.	345	345	17 25
Freese, A. J.	450	20	1 00
Freese, A. J.	659	50	2 50
Freese, A. J.	671	9	45
Hildebrandt, Henry	256	65	3 25
Hildebrandt, Henry	257	100	5 00
Hildebrandt, Henry	258	1,000	50 00
Hoover, John D., Trustee	361	667	33 35
Hoover, John D., Trustee	1060	433	21 65
Hoover, Miss Esther	979	100	5 00
Holbrook, W. E., Trustee	897	10,000	500 00
Holbrook, W. E., Trustee	898	11,000	550 00
Holbrook, W. E., Trustee	899	4,500	225 00
Holbrook, W. E., Trustee	900	4,500	225 00
Holbrook, W. E., Trustee	958	2,000	100 00
Holbrook, W. E., Trustee	959	2,000	100 00
Holbrook, W. E., Trustee	960	2,000	100 00
Holbrook, W. E., Trustee	974	2,000	100 00
Holbrook, W. E., Trustee	994	1,200	60 00
Holbrook, W. E., Trustee	995	1,000	50 00
Holbrook, W. E., Trustee	996	1,000	50 00
Holbrook, W. E., Trustee	997	1,000	50 00
Holbrook, W. E., Trustee	998	1,000	50 00
Holbrook, W. E., Trustee	999	1,000	50 00
Holbrook, W. E., Trustee	1000	1,000	50 00
Holbrook, W. E., Trustee	1001	1,000	50 00
Holbrook, W. E., Trustee	1118	2,000	100 00
Holbrook, W. E., Trustee	1119	2,000	100 00
Holbrook, W. E., Trustee	1123	2,000	100 00
Kessing, E. L.	838	15	75
Lucas, Mrs. T. R.	848	10	50
McCuen, Mrs. N.	305	2	10
McAllister, H. L.	1071	100	5 00
Murrey, Peter William	70	1	05
Niedecost, August	207	28	1 40
Opitz, Conrad E.	343	10	50
Peters, W. S.	60	15	75
Peters, W. S.	334	500	25 00
Peters, W. S.	672	5	25
Pipher Jos. E.	102	2	10
Reynolds, Timothy	21	5	25
Schindler, Louis C.	303	2	10
Shead Mrs. Dora L.	920	100	5 00
Smith, James B., Trustee	985	1,000	50 00
Smith, James B., Trustee	986	1,000	50 00
Smith, James B., Trustee	987	1,000	50 00
Smith, James B., Trustee	988	1,000	50 00
Smith, James B., Trustee	989	1,000	50 00
Smith, James B., Trustee	990	1,000	50 00
Smith, James B. Trustee	991	1,000	50 00
Smith, James B., Trustee	992	500	25 00
Tarpey, W. J.	675	14	70
Walser, Mrs. Lizzie	332	125	6 25
Young, Richard	746	91	4 55
Young, Richard	754	167	8 35
Young, Richard	758	100	5 00
Young, Richard	761	328	16 40

And in accordance with law, and an order from the Board of Directors, made on the 26th day of March, 1901, so many shares of each parcel of such stock as may be necessary, will be sold at public auction at the office of said corporation, in Rooms 322-323 Parrott building, San Francisco, California, on MONDAY, the 27th day of May, 1901, at the hour of 1 o'clock P. M. of said day, to pay said delinquent assessment thereon, together with costs of advertising and expenses of sale.

J. C. ANTHONY, Secretary.

Office—Rooms 322-323 Parrott building, 325 to 355 Market St., San Francisco, California.

POSTPONEMENT.

By order of the Board of Directors, the day of sale of the above delinquent stock has been postponed to MONDAY, the 24th day of June, 1901, at the hour of 1 o'clock P. M., at the office of said corporation in Rooms 322-323 Parrott building, San Francisco, California.

J. C. ANTHONY, Secretary.

Office—Rooms 322-323 Parrott building, 325 to 355 Market St., San Francisco, California.

Mr. S. A. Parnal, Superintendent of the Old Dominion Copper Mining and Smelting Co., Globe, Arizona, writes us February 5, 1901:

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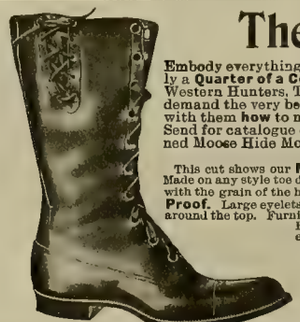

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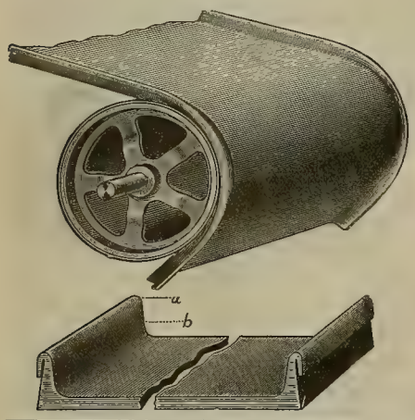

It has taken years of ceaseless testing and experimenting to produce the superior belt which we now offer, with elastic flanges and pliable body reinforced with specially woven duck. Every belt is manufactured by experienced workmen, and carefully tested on machines especially built for that purpose; consequently we are to-day manufacturing the best belts that mechanical ingenuity, combined with honesty of construction, can possibly produce.

SUPT. OFFICE WILDMAN GOLD MINING COMPANY,
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MR. JAS. S. BROWNELL, 132 Market St., San Francisco, Cal.—DEAR SIR: Replying to your favor of the 18th inst., will say that in the two mills operated by this company we have nineteen of your Patent Lip flange concentrator belts in use; some of them have been in constant use for the past two years and have given entire satisfaction. I know of no better flange for a side shake machine.

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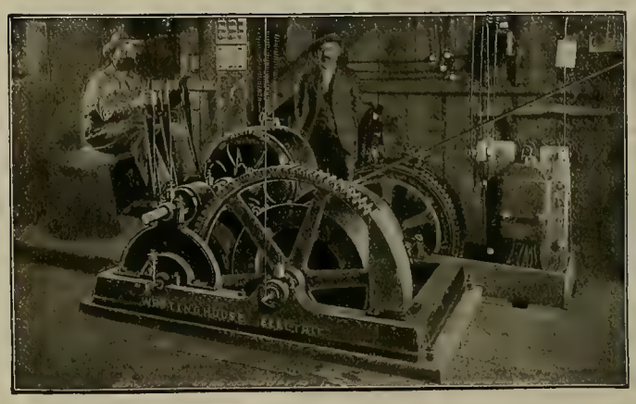

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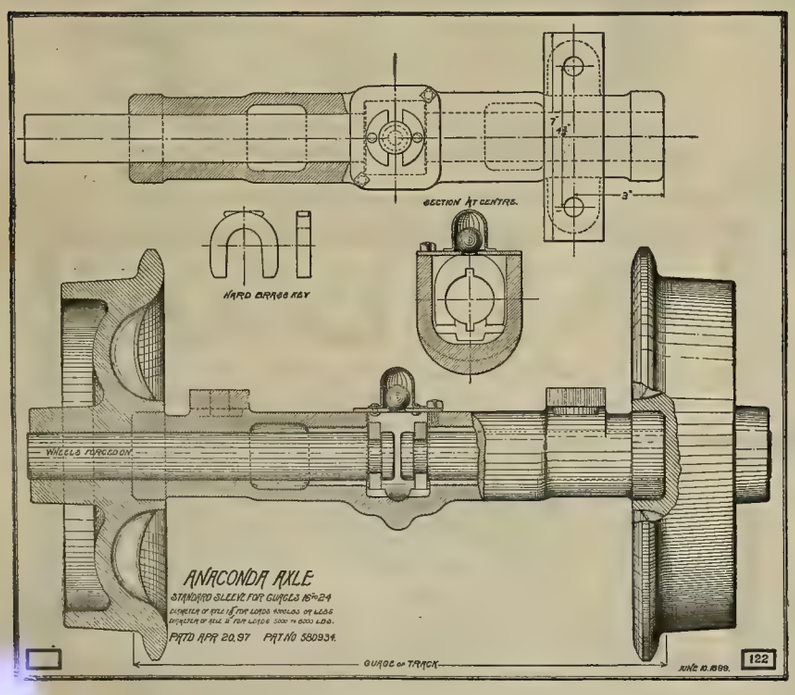

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MINING AND SCIENTIFIC PRESS.

Whole No. 2135.—VOLUME LXXXII. Number 25. SAN FRANCISCO, SATURDAY, JUNE 22, 1901. THREE DOLLARS PER ANNUM. Single Copies, Ten Cents.

Ore Sorting House and Dumps Lenora Copper Mine, Vancouver, B. C. (See page 282)

On the Lenora & Mount Sicker M. Co. R. R., Vancouver, B. C. (See page 282.)

MINING AND SCIENTIFIC PRESS.

ESTABLISHED 1860.

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San Francisco, June 22, 1901.

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IT is an interesting fact in connection with high grade ore and matte production on the North Pacific coast that if freights across the Pacific ocean to Hongkong by the tramp steamers were reduced to the same mileage rate as now exists between New York and Hongkong by the Suez canal, that shipments could be made to refineries on the Atlantic coast cheaper by steamer, via the Suez canal, than by rail across the continent.

THIS paper suggested some time since to the petroleum producers of California that the petroleum could be economically converted into electrical energy at the wells and thence transmitted to the desired point of use. Precisely this thing is being done in the Baku field in Russia. A large electric plant is being erected to supply power and light for the well-boring and other operations of the entire district. The same construction in any one of the producing California districts could not fail to result in considerable economy.

THE scrippers, failing to secure valuable oil-bearing lands in California over the legitimate mining appropriations of other people, would seem to be hunting more litigation. Scrip is claimed to have been located on mining lands in Tuolumne county, and it has been necessary for miners to protect their holdings by protests to the Land Department at Washington. With the law so explicitly adjudicated, there is not the shadow of an excuse for the attempt to acquire mineral lands by agricultural land scrip, and it would seem as if there ought to be some provision of law under which the cost to legitimate miners of fighting the willful, unlawful acts of scrippers could be collected from them.

THE reported sale of the Sweepstake placer mine, situated near Weaverville, in Trinity county, Cal., for, it is said, $5,000,000, is calculated, when the facts are considered, to make men who have believed that California placers were worked out, revise their opinions. The sale figure reported is the largest amount ever given for a California mine, and as well the largest sum ever paid for a placer mine. For the three-thousand-acre property it is at the rate of $1666 an acre, or, more exactly, for the one thousand acres, or about that, of channel, $5000 an acre. The gold yield of channels in Placer and Nevada counties, prospecting nothing like this property, is said to have been $40,000 an acre, without attracting more than local attention. The Sweepstake is not an old mine. It is virgin ground, barely broken into and only discovered within the past year. It will call attention to the fact that is not given the industrial importance it should have that, considered with reference to the total gold-bearing area, California is far in the lead of all other countries in the richness of its placer deposits.

A Suggestion.

It is recognized that differences arise between mine managers and mine workmen over the amount of compensation or wages the latter shall receive. Separated from local and personal differences that color more or less every dispute over this question, the essence of all of them is, (1) from the point of interest of mine manager is that he must keep as low as possible the unit cost of work under his charge; (2) from the standpoint of the workman that he must get as large a money compensation as possible for his units of time. Very generally and briefly, but not as accurately expressed, less costs on the one side as against more wages on the other.

The writer's experience with a somewhat similar problem is suggested as a possible solution of some of the many difficulties that arise between mine management and mine labor.

While acting as manager of a mine, a more rapid rate of advance of a certain drift was desired. Two nine-hour shifts, each of two drillers and one mucker and car man, tested by several months' work, made a monthly advance of 66 feet for fifty-eight shifts. The wages paid were $2.50 a day to the drillers and $2 a day to the mucker. There was no dispute over wages. The costs per foot figured out:

Mining, or drillers' wages	$4 40
Mucking, wages	1 75
Blacksmith, wages	1 08
Explosives	50
Total	$7 73

The men were offered a contract at $7.75 a foot, but were not willing to accept it less than $10. They did not say so, but really they thought there was some mistake in the figures. Anyway, as they expressed it, "they could not see where they could make anything over wages at $7.75 a foot. They were doing the best they knew how, and the rock might get harder and they would not make wages."

The writer finally made this offer to the drillers: That their average advance for fifty-eight shifts had been 66 feet; that for the first 4 feet increase on that to 70 feet advance for fifty-eight shifts they would receive no compensation additional to their wages. But for each foot over 70 feet up to 75 feet they would receive $4.50 a foot, and for each foot over 75 feet $5 a foot, these payments to be a bonus supplemental to their regular wages and to be divided equally among the four members of the drilling crew. The proposition was accepted by the men simply because there was nothing to refuse. They really thought they had reached the limit of what they could do, and expected no bonus.

The first month's work showed for fifty-eight shifts 73 feet advance and the four drill men each received $3.50 bonus over and above their wages. The cost of the work per foot figured out:

Labor—Drillers' wages and bonus	$4.17
Mucking, wages	1.60
Blacksmith	.98
Explosives	.50
Total	$7.25

The second month the drillers, encouraged by the bonus, which had come to them rather unexpectedly, and without special effort on their part, undertook to get the benefit of it. The heading was advanced 99 feet in fifty-eight shifts and each of the drillers received a bonus of $35.60, which, added to their daily wages of $2.50 per shift, made their earnings $3.77 per day. The costs now figured up per foot:

Labor—Drillers' wages and bonus	$4.37
Mucker, wages	1.17
Blacksmith	.72
Explosives	.50
Total	$6.76

There was no change in the hardness of the rock that was appreciable, as the consumption of explosives per unit of rock broken did not decrease, but remained precisely the same. The miners simply did better and more work in the same time.

Now, the point in the preceding statement of actual experience is this: The management got what it wanted—more speed and lower cost per unit of work accomplished—and the workmen, along with a guarantee of a satisfactory wage, so that they could not lose, also got what they wanted—more money per unit of their time.

In this particular case, counting the additional savings per foot to the mine operator of candles, blacksmith supplies, salaries and office expense, the aggregate of saving was a little over $2 a foot of drift. At the same time, the drillers made 51% more than the current wages per day and received substantially the same amount per foot of drift advanced.

Trade Catalogues for Foreign Countries.

The trade catalogues published by our advertisers have many points of excellence for the purpose for which they are designed. For customers for the goods and machinery offered who are in the United States, Canada and Mexico, within almost telephone communication with the supply houses and machine shops, they meet practically every requirement. Undoubtedly, by far the greater number of customers, actual and prospective, accustomed to the business methods with which they are co-related, do and can make the best possible use of them just as they are.

But there are other countries, other peoples and other trade than the United States, Canada and Mexico. They have not the telephone touch with supply houses and factories that the latter have, and the business methods which would cause them to make use of it if they had. These people are, however, in commercial need of manufactures and machinery that the trade catalogues referred to are intended to facilitate the selling of. These publications fail of accomplishing their purpose with these possible customers of other countries from several causes. They are printed in English, when the customer only speaks German, French, Russian, Spanish or Portuguese. Dimensions and weights are given in English feet and pounds, whereas all these foreign customers use the metric system of measures and know no others. Prices are not printed at all in the catalogues, and the printed statement that prices will be quoted on application F. O. B. at the factory is not an incentive to make inquiry by expensive telegraphing.

Writing from personal knowledge, manufacturers who desire to do a foreign trade, and use their catalogues to aid it, should correct these defects in special editions for the foreign countries. They should be printed in the language of the country intended to be commercially exploited. Dimensions and weights should be in the metric systems. Prices should be printed in the money of the country and quoted delivered, freight paid at the commercial port of entry of the foreign country, or, at any rate, F. O. B. at New York or San Francisco. There is no great difficulty involved in quoting prices at the foreign port of entry. About all such places are reached by established steamer lines with fixed freight rates. This detail is frequently quite important. The writer recalls losing the sale of 400,000 ounces of silver by reason of a cabled request for a quotation, freight and insurance paid at port of entry, being answered by a quotation F. O. B. at San Francisco.

MINE MANAGERS who have charge of the operation of steam pumping plants, and mining engineers who have to design such plants, will find much valuable information in the analysis of "Leadville, Colo., Pumping Practice," written by Mr. A. W. Warwick and appearing in this and the preceding number of this journal. The subject is of exceeding interest from the magnitude of the sums of money affected by the efficiency of the pumping practice. There is no machinery plant about a mine in which economy of operation is so vitally important. Mr. Warwick's analysis of pumping practice is made in a form so clear and comprehensive, that the application of his method to other operations, and the comparison of the figures obtained with a standard or other operations is easily within the facilities available to the operators of steam pumping plants. This journal will be exceedingly glad to receive the notes of similar tests of pumping practice. It is from the comparison of such exact data of actual practice that pumps and the use of them are increased in efficiency and the dead costs of mining operations reduced.

Concentrates.

THE Bessemer limit of phosphorus for 50% iron ores is .05%. More than this renders the ore unsuitable.

THE solidity of a ring equals thickness plus inner diameter, multiplied by square of the thickness, multiplied by 2.4674.

OXYGEN is liquefied at —182.6° C., air at —193.9° C. and solidifies at —214° C., and hydrogen is liquefied at —238.9° C.

A NEW artificial abrasive, it is understood, is to be made in an electric furnace at Niagara by the fusion of corundum.

THE Calumet & Hecla mine, including the declared dividend, has paid to its stockholders $75,850,000. In all, 119 dividends have been paid.

IRON ORE containing more than 2% of manganese is undesirable for the manufacture of pig iron, but is well adapted for the making of steel.

AN examination of the black sand in the Atlin, B. C., district shows a large amount of fine gold. As is usually the case, it is found in the nonmagnetic portion of the sand after parting.

WIRELESS telegraphy is barely a commercially successful fact, yet it is reported that telephoning without wires and the electrical transmitting of pictures without wire is experimentally successful.

THE average cost charge per foot of bore hole drilled, for the carbons consumed, is 30 cents. This includes all kinds of rock except the extremely hard granites, the range of costs being from 20 to 70 cents.

FOR operating air drills, and for mine use generally, compressed air is used at from sixty to eighty pounds pressure to the square inch. There is a tendency developing from practice to use pressures up to 90 and 100 pounds pressure.

THE Liberty Hill hydraulic tailings dam was built in 1897 by the hydraulic method, described in this journal. Being intended for tailings, there was no sheet piling in the dam. The water flow was conducted past it by a spillway 40 feet wide.

THE Southwest Miners' Association will hold their annual meeting on July 9, 1901, in Los Angeles. It is said matters of great importance will come up for determination and members are requested by the directors to be present, if possible, otherwise to be represented by proxy.

TO FIND the H. P. required to pump water a given lift by a steam pump, multiply the total weight of the water to be lifted by the height in feet, divide the product by 33,000 and multiply the quotient by 1.5. The margin is required to compensate the water friction and losses of steam.

THE increasing export of tinplate from the United States, dependent now on import of the tin, will make tin mines within the United States increasingly valuable. The discoveries made in the Port Clarence district of Alaska are certainly worth testing for the development of minable deposits.

DR. VOGES, director of the National Board of Health at Buenos Ayres, is credited with the discovery that naphthalene neutralizes the poison of mosquito bites even where the spot bitten is considerably inflamed. If fresh bites are rubbed with the naphthalene, no swelling or inflammation follows.

THE commercial source of the precious emerald is Colombia, in South America, the particular locality being not far from Bogota, the capital. They are found also in Siberia and Hindustan, and some have been found in North Carolina. No precious emerald has yet been reported found in California.

THERE is no market in San Francisco for tungsten ores. Steel makers are the only people who are consumers to any extent. They will quote prices they will pay and advise if they have need of the ores. The quantity of tungsten steel used is not large, and recent discoveries of the ores are increasing the supply.

IT IS customary in moderate sized veins to have the levels 100 feet apart. Unless there is some special reason for the change they should not be made closer. They can sometimes be made with economy 120 or even 150 feet apart. Station cutting and drift opening is much more costly than the same cubic opening in stopes.

EXPERIENCE with a steam shovel in mining iron ore in open cut in Georgia shows that five or six men with a steam shovel can do the same amount of work as fifty men with the pick and shovel, and do it much cheaper. It is claimed that iron ore can be mined, washed and loaded on cars all by machinery for less than 50 cents a ton.

FRENCH automobilists have found that the consumption of alcohol as fuel, if used mixed in equal parts with benzine, was at the same rate as when benzine alone was used; but, if the alcohol was used unmixed, twice the quantity as compared with benzine was required. Alcohol in France is cheaper than benzine, the latter costing about 40 cents a gallon.

THE applications from members and guests for the Mexican meeting excursion of the American Society of Mining Engineers already exceed the capacity of a single train, and an additional one with accommodation for eighty persons is to be provided. The secretary urgently requests advice of intention to go from members at the earliest possible moment.

STEEL and concrete were the materials used in the construction of a submerged tunnel supplying condensing water to the power house of the New York Edison Co. The tunnel is 225 feet long, 12½ feet in diameter, weight 1200 tons, made with exterior and interior shells of ⅜-inch sheet steel, between which is 15 inches of concrete. The tunnel was built on land in a ship yard, launched and towed into position before being submerged.

A TELEPHONE equipment for a mine is a money saving investment almost regardless of the cost of installation. For a large mine it is a practical necessity, keeping all parts of the works in instant communication with each other. For a small mine the time of employes that it will save will pay the cost of an ordinary installation in a few months. Experience has demonstrated that it is an economy even in preliminary work and prospects.

THE factor of safety for boilers is higher than used to safely hold water pressures. For the latter 2 to 3 are safety factors in general use, but for boilers from 4 to 6. That is, the bursting pressure for the boiler shell is divided by not less than 4 to fix the allowable maximum boiler pressure. The United States Government uses 4 as the safety factor for its marine boilers, other boilers are rated with 5 as a safety factor. A well-made boiler is safe with either when new, but after ten years' use the factor is increased to allow for deterioration.

IT has been decided that no formal meeting of the American Institute of Mining Engineers will be held at Buffalo, during the Exposition. Members visiting the Exposition are, however, assured of a hospitable reception and special attention from Dr. David T. Day, superintendent of the Department of Mines and Metallurgy, and from the Engineers' Society of Western New York, which has invited all visiting engineers to its rooms, 965 Endicott square, where they can receive their mail and where the services of stenographers and guides will be available.

WHILE coal seems fairly abundant and well distributed in Alaska, transportation conditions will make it impossible in some localities. As a substitute for it, peat, which is more abundant than coal, can be used. The Swedish method of preparation consists in drying it by artificial heat, reducing the moisture to 15% and compressing it into briquettes. The peat is shredded before the application of the drying heat. The cost in Sweden, working a twenty-ton plant 300 days, is $2.16 a ton. The labor costs are lower there than possible in Alaska. Allowing for this difference, the cost per ton there would be about $12.

THE dynamite powder manufacturers all have special trade secrets which they use to modify the general type of process which is much the same with all of them. None of them have yet found a method of manufacture which is absolutely safe, or even safe at all. With the utmost care, and with the most perfect knowledge, accidental explosions are continually happening invariably with loss of property and all too frequently with loss of life. The handling of the powder after it is manufactured is hardly comparable for danger with the manufacture. Better pay the government tax on it than undertake its manufacture to beat the tax collector.

EPIGENITIC, as used in geology, is, according to the dictionary, the equivalent of metamorphism. Propylitization is undoubtedly a derivative of propylite, the youngest series of volcanic rocks, according to Richtofen. So considered, it would mean the state of being changed to an eruptive of this series. This literal meaning is not probably the meaning with which the word is used in all geological discussions in which it appears. Where the context and the dictionary fail to make clear the meaning of a geological term, recourse must be had to the geologist who used it, or, where it is an entirely new term, to the geologist who invented it to express his idea.

A "T" SQUARE, with a scale pasted on the working edge, with a datum line mark on the base edge of the triangle used with it, will be found to facilitate and lighten the labor of drafting very materially. The measurement of the spacing of lines on drawings is effected coincident with the ruling. It is not necessary to mark off the points in advance by prick points from a scale or by the use of a divider. For the use of a vertical scale it should be fastened or pasted, preferably the latter, on the edge of the drawing-board. The head of the "T" square is beveled down and a datum line is marked on the bevel so as to meet the edge of the scale. Paper scales for these purposes are satisfactory. It is also a convenience to have pasted on the top of the "T" square copies of frequently used formulas and tables.

SOME costs of diamond core drilling operations that are useful in estimating on prospective drilling are the following: Cost of twelve holes 200 to 800 feet deep, 5957 feet of boring, per foot, $2.49; cost of eighteen holes, 5046 feet of boring, in northern Michigan, $2.604 per foot; 7959 feet of boring, nearly all underground, $0.884 per foot; six holes, 2626½ feet, $0.986 per foot of boring; 296 feet of boring cost per foot $4.322; eight holes, 2922½ feet, cost per foot $1.324; nine holes, total depth 2091 feet, cost $2.374 per foot; twenty-one holes, 4684 feet of boring, cost $3.007 per feet; twenty-eight holes, 3746 feet, cost per foot $1.195; 13,312 feet of boring cost $0.733 per feet. Generally the cost is much less in working mines than in purely prospecting operations. Superintendence, and in fact practically all charges except wages and diamonds, are averaged down when the drilling is part of the larger operations.

A PROCESS employed for waterproofing brick walls consists of two solutions applied alternately, one being of soap and water and one of alum and water. Dissolve three-quarters pound of soap in one gallon of water, and one-half pound of alum in four gallons of water. The first, or soap, solution should be at boiling point, and the walls clean and dry. Apply with flat brush, taking care to form no bubbles on surface of brick; allow the coat to remain twenty-four hours. Apply alum solution, which should be about lukewarm, and allow this also to remain twenty-four hours. Continue the operations alternately with the two solutions until the walls are found to be impervious to moisture. The alum and soap form an insoluble compound which fills the pores of brick and prevents absorption of moisture. Two coats of each solution is considered sufficient for brick walls under ordinary conditions.

TO CALCULATE pulley diameters and revolutions, the driving pulley being called the driver, and the driven pulley the driven, to determine the diameter of driver, (given the revolutions of driver and the diameter and revolutions of driven pulley): Diameter of driver = diameter of driven × revolutions of driven ÷ revolutions of driver. To determine the diameter of driven (given the revolutions of driven and diameter and revolutions of driving pulley): Diameter of driven = diameter of driver × revolutions of driver ÷ revolutions of driven. To determine the revolutions of the driver (given the diameter and revolutions of the driven and diameter of the driving pulley): Revolutions of driver = diameter of driven × revolutions of driven ÷ diameter of driver. To determine the revolutions of the driven (given the diameter and revolutions of the driving and diameter of the driven pulley): Revolutions of driven = diameter of driver × revolutions of driver ÷ diameter of driven.

FOR foundations for machinery, buildings and for floors, only the best brands of Portland cement should be used. The proportions may be as follows: One part of cement, three parts of clean, sharp sand and five parts of stone broken small enough to pass through a 2-inch ring. In preparing the concrete the sand and broken stone must first be washed clean. The three ingredients are then mixed and additional water added by a spray to make a pasty matrix, the whole being worked over and immediately deposited in place. It must be well tempered, and in heavy work the layers should not exceed 12 inches in thickness, which must be allowed to set at least twenty-four hours before the next layer is added. For one cubic yard of concrete made as above, there will be required one barrel of cement, one-half cubic yard of sand and one cubic yard of broken stone. Finishing the surface of floors one-half inch thick is done with one part of cement to two of fine, clean sand, the final surface being floated. For heavy work make the coat 1 inch thick. This last thickness for each square yard of surface will require .182 barrel of cement and .091 barrel of sand.

LARGE MASSES of the gold-bearing quartz conglomerate found on some of the island beaches of southeastern Alaska are not the auriferous quartz conglomerate mined in the Transvaal, and are not indicative of the existence in place of minable deposits of similar conglomerate. These float masses owe their origin to the existence of novel conditions. Examination will show the auriferous quartz to be partly in angular fragments and partly water worn. The cementing material is calcite, colored a dark brown by the oxidized iron pyrite originally present in the quartz. The country rock adjacent to the conglomerate boulders is a more or less pure crystallized limestone, containing gold-bearing quartz veins. The mode of formation of the conglomerate from the limestone country rock and its auriferous quartz veins was probably somewhat as follows: Geologically, the country rock appears to be subsiding from a condition of elevation much more considerable than at the present time. During this period of elevation surface waters formed open channels in the limestone, frequently directly underlying the quartz veins, and, oxidizing the pyrite in the quartz, broke it down from place and carried it down the steeper portions of the open channels or caves and accumulated it in the flatter places. The rounded, water worn character of some of the quartz indicates both volume and velocity to the old flows through these water channels, and it would seem that under such conditions the water did not become saturated with calcite in solution. Later, with subsidence and regional changes, the force and quantity of water flow becoming diminished, a condition of saturation of the smaller quantity of water with the calcite occurred and the latter became deposited in the interspaces of the quartz fragments, ultimately cementing them and closing the water channel. Coming by subsidence in reach of wave erosion, the quartz in the conglomerate, being harder, has protected the mass from disintegration after the enclosing limestone has been dissolved or eroded away. On the land surface the evidence of the phenomena described exists in still open caves descending below the sea level. The openings could only have been formed with drainage. These are found, in mine openings on the quartz veins, to contain large fragments of auriferous quartz, sometimes cemented together with calcium carbonate and sometimes in water worn boulders. Clear of the ledges are found, in places exposed by the surface erosion of ravines, masses of conglomerate identical in composition with the float masses found on the beaches.

Leadville, Colo., Pumping Practice.

PART II.

Written for the MINING AND SCIENTIFIC PRESS by A. W. WARWICK.

PUMP DUTIES.—It is exceedingly difficult to compare the efficiency of one pump with another owing to the different methods in vogue of stating the duties. Thus the duty reported of the pumps in Cornwall is stated in terms of the foot pounds of useful work done by a bushel of coal burnt (94 pounds of Welsh coal). In the Lake Superior district it is given in terms of the foot pounds of useful work done by 100 pounds of coal. To make confusion worse confounded, the pump makers are using a duty of so many foot pounds per 1000 pounds of dry steam. All these duties are of really very little value, since, if stated in terms of coal burnt, no real criterion is established owing to the variation of the quality of coal used. If stated in terms of dry steam used, then we have no means of knowing the efficiency of the whole plant, including steam line, boiler, etc. The American Society of Mechanical Engineers propose a new method of stating the duty, which is becoming largely adopted. This duty gives the number of foot pounds developed by the pump per million British thermal units furnished from the boiler. This gives an absolute comparison between different pumps. It is, however, yet defective, since this duty does not take into account the personal factor of the boiler attendants. The final duty should show the useful effect of the machinery and the men. The American Society of Mechanical Engineers' duty shows the effect, or economy, of the machinery only. I propose that—for mining pumps, at all events—the duty should be expressed in terms of the number of foot pounds developed by the pump per million British thermal units fed to the boiler in coal. It is obvious that this latter duty will enable a comparison between different pumping plants of which plants the men in charge form an essential part. Still, to enable a comparison to be made between Leadville pumps and those of other districts, the duty is expressed in foot pounds developed by 100 pounds of coal, by 1000 pounds of dry steam, by 1,000,000 British thermal units from the boiler, and by 1,000,000 British thermal units contained in the coal. A series of duty tests made on the compound, duplex, steam-jacketed Jeanesville pump at the Ibex mine at Leadville shows a very high duty for such a type of pump. The pump station is about 1000 feet underground and about 3500 feet from the boilers. The size has been given, viz., 15x28-inch steam cylinders, 38-inch stroke, 7½-inch plunger. It has a jet condenser, steam line 6 inches diameter protected by ⅛-inch asbestos paper, ⅝-inch felt, ⅛-inch paper, all covered with galvanized sheet iron, every joint of which was carefully soldered; water column, 13½ inches diameter. The elevation of the station above sea level is about 11,000 feet. The following average figures per twenty-four hours were obtained:

Water Figures.—Water delivered 65,733 gallons, head 1136 feet; water delivered 1,252,390 gallons, head 933 feet; total foot pounds, 10,358 million per twenty-four hours; total water delivered, 1,318,123 gallons by plunger displacement.

Coal Figures.—Coal burnt, 23,000 pounds; ash made, 2330 pounds = 10.1%; British thermal units in coal, 237.45 million.

Boiler Figures.—Steam pressure at boiler, 82 pounds; feed water temperature, 143° Fahr.; total water evaporated, 175,446 pounds; evaporation per pound of coal from 143° Fahr., 7.62 pounds; British thermal units supplied by boiler, 206.67 million.

Condensation in Steam Line.—Radiation surface of line, 2050 square feet; water condensed and caught in traps and separator, 9144 pounds; entrained water in steam sent to pump, 4989 pounds; total condensation, 14,133 pounds; total condensation per 100 square feet radiation surface, 689.4 pounds; dry steam supplied to engine, 161,313 pounds.

Steam Cylinders of Pump.—Dry steam supplied to air pump condenser, 9600 pounds; dry steam supplied to steam cylinders, 151,713 pounds; indicated horse power of engines, 261.4 horse power; dry steam used per indicated horse power per hour, including condenser pump, 25.7 pounds; dry steam used per indicated horse power per hour, not including condenser pump, 24.2 horse power; steam accounted for by indicator diagrams, 23.9 horse power.

Pump.—Useful work done by pump, 217.9 horse power; loss in friction, 43.5 horse power; total indicated horse power, 261.4.

Recapitulation.—* Total steam used per pump horse power, 33.4 pounds per hour; dry steam used per indicated horse power, 25.7 pounds per hour; total steam used per indicated horse power, 27.9 pounds per hour; coal burnt per indicated horse power, 3.6 pounds per hour; coal burnt per pump horse power, 4.3 pounds per hour. * Figured from water evaporated at boiler.

Duties.—Foot pounds of useful work per 100 pounds of coal, 45.0 million; foot pounds of useful work per 1000 pounds of dry steam, 64.2 million; foot pounds of useful work per American Society of Mechanical Engineers' unit, 50.2 million; foot pounds of useful work per million British thermal units contained in coal, 43.2 million.

This test shows that the duty of an underground pump 3500 feet from the boiler is not as low as frequently stated. A number of useful facts can be obtained in addition—especially on the losses by radiation in the steam pipe. The tests show that the condensation per 100 square feet radiation surface shown by trapped water is 446.0 pounds per twenty-four hours; condensed water per 100 square feet entrained by the steam is 243.3 pounds per twenty-four hours; total 689.3 pounds per twenty-four hours.

*Some tests made at the old Wolftone shaft some years ago show that 585 feet of 4-inch steam pipe, covered with asbestos paper and felt, gave a loss of 8.369 cubic inches of water per 100 square feet of radiation surface per minute, which is equivalent to 436.4 pounds per twenty-four hours. In this latter test the water was trapped out, so that it compares with the figures given above, 446 pounds of water condensed per 100 square feet of 6-inch pipe. This latter figure may be safely used in calculating condensation losses, but it is necessary to allow 50% for the water entrained by the steam after leaving the separators or traps. The tests also show that when indicator diagrams are calculated out a very close

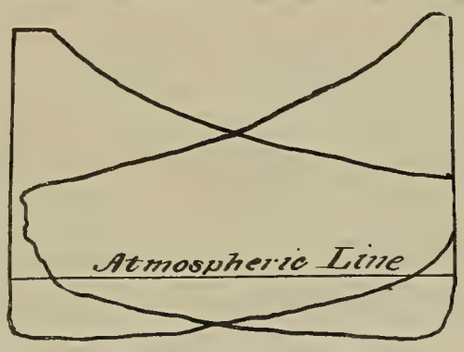


Diagram from H. P. Cyl. Ibex Pump, 16 Spring.

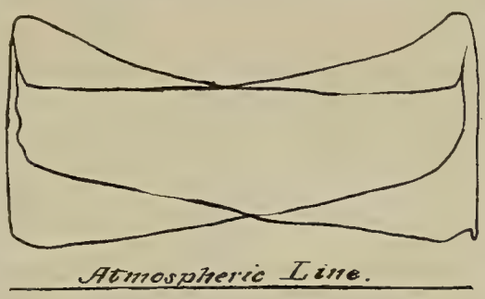


Diagram from L. P. Cyl. Ibex Pump, 40 Spring.

approximation of the water or steam used by the pumps can be found. When indicator diagrams are taken from condensing mine pumps both the main pump and the condenser must be indicated.

Tests of other big pumps could be given, but they would be a mere repetition of the above. The duty of the triple expansion pumps is from 10% to 20% greater than the compounds.

The cost of pumping is very variable, as is to be expected. The Downtown Pumping Association charges 10 cents per 1000 gallons pumped. The average depth of the pumping done by that association may be put at 600 feet. The cost on the basis used in city water works—1,000,000 foot gallons, or 1000 gallons raised 1000 feet—is in the association 16.6 cents per million foot gallons. It really does not quite cost this, but as the association is a mutual benefit affair no complaint is heard. The pumping plant of the Downtown Pumping Association is not up to date, but it gives a fair idea of the cost of pumping in the older mines. In the newer mines, using triple expansion engines, the cost may be put at 6.86 cents per million foot gallons. The cost in detail may be estimated as follows:

	Cents per million foot gallons.
Fuel	3.8
Labor	1.8
Management	0.6
Waste, oil, light	0.3
Taxes and insurance	0.18
Interest on capital	0.18
Total	6.86

When sinkers are used these costs are not even approximate. It may be safely figured that the cost of operating a sinker is from 40 cents to 50 cents per million foot gallons.

The average cost of pumping in Leadville, including all operations, is as follows: (1) When a normal amount of prospecting is going on and few sinkers are at work the cost per million foot gallons is about 18 cents; (2) when a large amount of prospecting is going on and many sinkers are at work the cost is about 25 cents.

A feature of the camp not alluded to is the interdependence of the flow of water. For example, when the Valentine shaft reached a certain depth the flow of water suddenly increased and the Penrose shaft went dry. When the Valentine suspended operations the Penrose had to resume pumping. These facts have become so obvious that the idea of association is gaining ground rapidly, especially as the present association is limited in its territory. It would be to the advantage of all if the association were widened and the expenses of pumping justly and equitably divided among the parties.

*Bulletin 18, California State Mining Bureau.

The Lenora Mine, Vancouver Island.

Written for the MINING AND SCIENTIFIC PRESS.

Vancouver island, nearly 300 miles long and as much as 70 in width, settled at Victoria and in its vicinity at the southern end for over half a century, has only in the last few years been considered to be a possible metal-producing field. In the recent enlightenment by some large exploitations that are successfully productive, that this condition could have existed so long seems surprising.

The Lenora mine is on Mount Sicker, distant 40 miles from Victoria on the Esquimalt & Nanaimo railway; the mine is reached from Westholme station by stage or by the mine railway, the distance being about 6½ miles. It is owned by the Lenora & Mount Sicker Copper M. Co., of which Henry Croft, M. E., is the manager.

The mineral-bearing formation on Mount Sicker is a schist belt running nearly east and west and dipping 80° to the north. The width of the belt is about a mile and a half. The formation adjoining south is slate and north black shales and conglomerate. The schist is siliceous in character, more or less impregnated with calcite and talcose in structure. Porphyry dikes cut through it. The mineral-bearing character of the belt extends for many miles. Up to the present time its principal development is the Lenora mine.

The mine is situated at about 1400 feet above the sea level. The main vein is about 60 feet wide; the ore body runs from 20 to 35 feet in width; the main stope has eighteen floors; two tunnels have been driven at different levels, and a third one has been started, and will be run with a two-drill (Rand) compressor; this tunnel will run 1200 feet on the vein. A parallel vein was cut 30 feet in width and about north of the south vein 160 feet; the first assay in the vein went gold $130, silver 696 ounces; copper 14%, or about $525 per ton. On the next claim, the Tyhee, this same vein was lately struck in a crosscut and heavy free gold was found. The vein has been now proved at four levels.

The illustrations on the first page of this number show some of the surface improvements built along with the underground exploitation. The mine opening being by tunnel there are no costly machinery plants. The local timber furnished the lumber for the ore bins and sorting sheds. The principal problem, transportation, was solved by the construction of the narrow gauge railroad from the mine to Westholme station on the Esquimalt & Nanaimo R. R. At present ore is here transhipped and taken to Ladysmith, thence another handling and it goes to the smelter by steamer.

The Lenora railway is to be constructed to the sea at Osborne bay. Grading is already completed. The sea shipment from this point, avoiding the handling and second railroad shipment, will save $2 a ton alone. The construction of a smelter at the seaport terminus of the railroad, arrangements for which have been made, will make a very considerable additional saving. The Lenora mine has shipped from March, 1899, to June 1st, 1901, about 14,700 tons of copper ore—chalcopyrite—of an average value of $20 per ton, being $3.50 gold, $2 in silver and $14.50 copper. The net values realized on this after payment of smelting charges was $200,314. On the second-class ore dumps there are at the mine about 15,000 tons averaging in values about $12 a ton. This ore is reserved pending the construction of the smelter at Osborne bay. The output from now on will be considerably increased.

The successful development of the Lenora has been a stimulus to the exploration for other mines. Many other claims at Mount Sicker have been located and on some of them considerable development expenditure is being made. A mining town is springing up at the terminus of the railroad that is so new that stumps of the timber are not out of the streets yet. Natural conditions favor successful exploitation in the district. The mining is by tunnel. Transportation costs are at a minimum. Smelting fuel in the best quality of coke is close at hand.

ACCORDING to a method devised by Prof. Pictet, of Switzerland, ordinary air is drawn slowly through a condenser which is cooled by a jacket kept filled with liquid air. In the condenser the low temperature causes the oxygen to separate by gravity from the nitrogen. The former is drawn off at the bottom of the condenser and the nitrogen at the top. Any carbonic acid present will become liquefied by the cold and will accumulate at the bottom, whence it may be tapped off through pipes. The inventor claims to be able in this way to make 500,000 cubic feet of oxygen daily by the expenditure of 500 H. P.

Electrolytic Precipitation From Potassium Cyanide Solutions.

Written for the MINING AND SCIENTIFIC PRESS by J. H. JORY.

There has come into practice in South Africa and Australia an electrolytic method of extracting gold from solutions of this metal in potassium cyanide, which has been superseding the more expensive practice of the zinc precipitating process of the MacArthur-Forrest patents.

This electrolytic method, which is most generally known as the "Siemens-Halske process," has a number of advantages over that of the MacArthur-Forrest process. To point out these is not the object of the present article, but it is to call attention to a number of points in which the former is much less effective than it should be, and to the improvement of which an electrolytic method may arrive at.

The zinc precipitation method calls for considerable expense in the first costs of the metal used, and also in its after preparation to reduce it to the filliform condition necessary for use in the zinc boxes. The gold is recovered in a very impure condition, making necessary considerable expense in its reduction and refining. The potassium cyanide destroys large quantities of the zinc and is itself destroyed. So pronounced are these useless and wasteful reactions that a large amount of both zinc and potassium cyanide are used in excess of that theorectically necessary for the desired extraction and precipitation. The process is also slow.

In the electrolytic process of precipitation as now operated in South Africa the electric current takes the place of zinc as a precipitating agent, the cost of power to produce the electric current being no more, probably, than that of producing the fibrous condition of the zinc necessary in the former method. The conditions of operating render it possible to extract a larger portion of the gold from the solutions, and there is a certain saving in the time and labor, in that lesser stoppages of the flow are necessary, a frequent change of the zinc from one cell to the other, combined with a tedious removal of the gold slimes, being necessary in the one case, while in the other a less frequent and more rapid changing of the lead cathodes for the recovery of the precipitated gold is required. The electric current may also be so adjusted that much less of the valuable cyanogen of the solution is destroyed in the latter than in the former process.

But, notwithstanding the several advantages enumerated, the electrolytic methods of the Siemens-Halske process seem still imperfect, and this because it follows in a great measure after the zinc precipitation method, there being the same condition of flow, nearly the same time consumed in the precipitation, and somewhat of the same difficulty and expense attending the reduction and refining of the product pertaining to the two methods.

I consider that these imperfections are not necessary to an electrolytic process, and are only incidental to an imperfectly constructed apparatus, on which the following description explains the improvements.

The Siemens-Halske process, briefly considered, consists of passing a flow of fluid about 3 feet in width and about 1½ inches in thickness between two electrodes a certain number of times—each time increasing the difficulty of extraction — until the greater portion of the gold existing in the solution is precipitated. The cathodes of this apparatus consist of a number of lead plates, which, under the conditions employed, must be fused and cupelled to obtain the deposited gold. The apparatus offers a very unnecessarily large electrode surface, which is wasteful of current and gives an inconvenient dispersion of the gold deposit.

According to the laws of the electro-chemical equivalents there is required, roughly, about one ampere of current to deposit one grain of gold in one minute. The apparatus of the Siemens-Halske process has a capacity of operating on about 100 grains of gold. Taking the latter quantity, and assume 10,000 grains to be extracted in one day, or about seven grains per minute. There would, therefore, be required for this deposition, theoretically, seven amperes per minute at about three volts tension—7 x 3 = 21 watts, or $\frac{21}{746}$ H. P. The current, however, as employed by the Siemens-Halske process amounts to at least fifty times this required power. There is at the same time about sixteen times the surface of cathodes exposed, more than is necessary to the operation performed, this making the unnecessary dispersion of the gold to which I have referrred.

There is also connected with this apparatus and process a loss of the element of time. It is a law of electrolysis that "electrolytic energy—all else being equal—is in proportion inversely to the square of the distance between the two electrodes." Therefore, if, instead of placing the electrodes, as in the Siemens-Halske apparatus, at a distance of 1½ inches apart, they are given a proximity of $\frac{3}{32}$ inch, there is an increase of power of depositing 256 times; so that, while in the former case there may be required to extract all the gold from a given amount of solution, that this should flow between the charged electrodes a distance of 256 feet at 1 foot per second, in the latter case the same results may be obtained by a flow of the distance of 1 foot only and at the same rate. But as we have, to obtain this result, decreased our capacity sixteen times, so, to operate on an equal amount, we should require an apparatus of the same width as that given, but having sixteen apertures of a proximity of $\frac{3}{16}$ inch between the electrodes and about 1 foot in depth. In such case we should have an apparatus of sixteen times less electrode surface and of the same capacity as that employed in the Siemens-Halske process. The employing of lead plates as cathodes, in the process named, appears to be entirely owing to a misapprehension of the conditions. It has been urged that by using iron plates as anodes and lead as the cathodes that a wasteful return current is obviated at such times as the ordinary current may be stopped. But the fact is that while this may be true at the moment of commencing the operation, immediately after, as soon as the cathode surface has become covered with even the slightest film of gold, this, in potassium cyanide, becomes the more electro-positive, whether the cathode is composed of lead or any other metal; and the only proper course is to stop the flow of solution the moment the flow of electric current ceases.

Copper, therefore, may be used as a cathode of such an electrolytic process as I have described, with the advantage of being made a permanent part of the apparatus, from which, by a simple treatment before using, the gold may be removed in a perfectly pure state and with no after reduction and refinement necessary.

The conclusion that I desire to present is that though the Siemens-Halske process has many advanvantages over the methods of zinc precipitation which it is now superseding, yet even this can be improved by the construction and practice I have described.

It cannot be doubted that when such a perfected apparatus and process is produced a very great acceleration will be given, not only to the electrolytic extraction of gold from solutions of potassium cyanide, but to many other metallurgical operations of a similar character.

Michigan College of Mines.

The Michigan College of Mines has received from the present Legislature of Michigan the largest appropriation in its history. It provides among other things for two buildings. One for the department of civil and mining engineering provides mining and hydaulic laboratories and a draughting room, together with lecture and class rooms. The other is for the departments of chemistry and metallurgy. Among the laboratories will be one for metallurgical operations.

The appropriation further provides an addition to the present engineering building, which will be devoted to the use of the course in blacksmithing. Provision is also made for extending the equipment of the electrical laboratory.

The work of planning for the erection of these buildings is already begun, and is being pushed rapidly. It is hoped that the buildings will be ready by the fall of 1902. The college is in a prosperous condition. The number of students in attendance shows a gain over that of any former year. With the increased facilities for instruction which will be provided by the new buildings and equipment, the college has every reason to expect still greater success in the next few years.

The Wilmerding School.

Many of our readers manifest much interest in propositions for industrial education, and we doubt not that reference to it in concrete form in the Wilmerding School in San Francisco will be acceptable. The school is at least so far a part of the University of California as to be administered by the regents of the University. It is also affiliated with the Lick School, as both institutions are under the directorship of Mr. George A. Merrill, and have shaped their courses of study so that one supplements the other. The administration of the Wilmerding School by a special committee, consisting of Regents J. F. Houghton, W. T. Wallace, S. C. Irving and President Wheeler, has been exceptionally wise and fortunate. By a circular which has just been issued, we learn that the regents received $400,000 from the estate of J. C. Wilmerding and that they have, from the accumulations of interest, bought the block of land, built the building, equipped it for the modern trades and have on hand in mortgages and cash $40,901.76 more than the original bequest. The annual income from investments is about $27,000; the annual expense, including salaries and incidentals, is about $20,400. Thus it is seen that expenditures are being kept well within the income, leaving ample funds for contemplated and necessary expansion. Nearly all the modern trades, in addition to a continuation of the grammar school requirements for entering, are taught by competent teachers, so that upon graduation the pupils go out with a good education in addition to full equipment for the special trade in which they have served their time.

SIDE ELEVATION.

FRONT ELEVATION.

Building Which the Pupils of the Wilmerding School Will Erect for Their Own Use.

One matter in connection with the school which seems to us of special significance as demonstrating the direct and practical character of the instruction is the announcement that the pupils will build a new building for their own use, of which the outline drawings on this page give a general idea. It will be a permanent, nearly fire-proof structure of brick and terra cotta, and work will be begun at the beginning of the next school year—July 24th. It will be built mainly by student labor, and will afford excellent instruction for several years. Its principal dimensions will be 160x70 feet. The two elevations shown are final only as regards the general mass and proportions of the building. If built by contract the cost would be about $60,000. The cost of materials alone will be about $40,000.

As to the arrangements for pupils, it is stated that any boy who has completed the grammar school is eligible for admission. Boys who have finished only the seventh grade will also be admitted, provided they are over sixteen years of age. Upon entering the school each boy begins an apprenticeship in one of the following trades: Carpentry, bricklaying, plumbing, blacksmithing, cabinet making, wood carving or clay modeling. The first year is probationary; at the end of that time any student who has failed to give promise of a successful career in the trade he has chosen will be required to change to another department.

Tuition is free and expenses for incidental things exceedingly small. The successful completion of a full apprenticeship of four years entitles the student to graduation as a journeyman. Any apprentice who leaves the school in good standing after two years' attendance will be granted a certificate showing the degree of proficiency he has attained in his vocation. The school will not guarantee positions to its graduates, nor will it promise equal ratings to all as journeymen. The first class will not be graduated until December, 1903, and it is hoped they will establish among employers a reputation that will ensure ready and remunerative employment for future graduates.

The New Edison Storage Battery.

NUMBER II.—CONCLUDED.

In the new Edison cell, on the other hand, the theoretical action of the potash solution is merely to provide the proper channel through which the oxygen ions may travel in one direction or the other—positive plate to negative plate in charge, and negative plate to positive plate in discharge. Consequently, the amount of solution needs only to be sufficient to fulfill mechanical requirements. It is believed that the weight of solution will in practice be only about 20% of the plate weight or about 14% of the cell weight. In fact the cell may be worked in the same manner as the so-called primary "dry cells." Moreover, if the solution should escape, or be carried away, by gasing in charging, the only detriment seems to be the loss of active surface thereby occasioned, and it will only be necessary to fill up the cells to the proper level with water from time to time as evaporation or gasing may lower the level. For the same reason the specific gravity of the electrolyte does not appreciably vary during charge and discharge.

The briquettes of active material slightly expand on receiving oxygen, and slightly contract on delivering it, that is to say, the iron briquettes contract and the nickel briquettes expand during charge, while on discharge the iron briquettes expand and the nickel briquettes contract. The level of the solution is in this way scarcely affected. The expansions and contractions of the briquettes appear to be well within the elastic limits of the spring-steel containing boxes, and consequently the electric current is always secure. The covers or sides of the window pockets merely approach to or recede from each other slightly during charge and discharge. Fortunately, steel is a metal which possesses this mechanical elasticity in a marked degree.

The action of the charging and discharging current upon the briquettes seems to be transferred from their external surfaces inwards in a manner similar to the transfer of carbon and oxygen in the process of making malleable cast iron in the furnace on the principle of cementation. No active material has been found to be ejected from the briquettes through the window perforations, even under deliberate overcharging and discharging. Such gas as is thereby produced makes its appearance on the external surface of the windows.

If the nickel compound had no affinity for oxygen, so that energy was neither developed nor absorbed in the deoxidation or further oxidation of that substance, then the energy would be entirely that due to the energy of combination of oxygen and iron, stated to be 79.7 watt hours, and representing an electro-motive force, theoretically obtainable, of 1.47 volts. If the combination of oxygen with the nickel compound be exothermic or energy-releasing, then the watt hours delivered (and the electro-motive force) will be lessened by the energy necessarily paid back to break up the combination.

If, on the other hand, the combination is endothermic or energy absorbing, then the watt hours delivered (and the electro-motive force) will be increased by the energy restored on breaking up the combination. Since the superoxide seems not to have been known hitherto, no information concerning its energy of combination is obtainable. The electro-motive force of the cell seems to be so near to that of the union of iron and oxygen as to suggest that the nickel superoxide is not far from being neutral, or that the nickel compound has but little affinity for oxygen, although the superoxide appears to be quite stable in the cell.

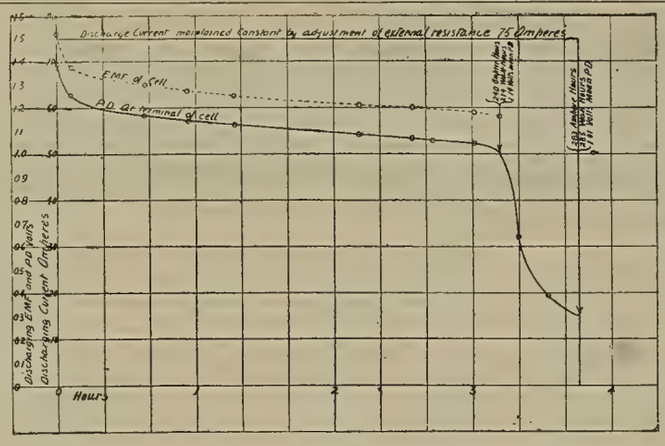
The new cell does not seem to be appreciably influenced by changes of temperature, and should stand a very low temperature without detriment. The electrolyte—potash—does not attack any of the ingredients of the cell, nor are any of the ingredients soluble therein. No local action occurs in the cell so far as has yet been observed since the electro-motive force is below that necessary to decompose water.

The cell may be fully discharged to the practical zero point of electro-motive force without detriment. In fact, a cell has not only been completely discharged, but recharged in the reverse or wrong direction, and after bringing it back to its originally charged state by proper restoration of the direction of charging current, the storage capacity remained unaffected. It would seem, therefore, that the cell should be capable of withstanding much abuse.

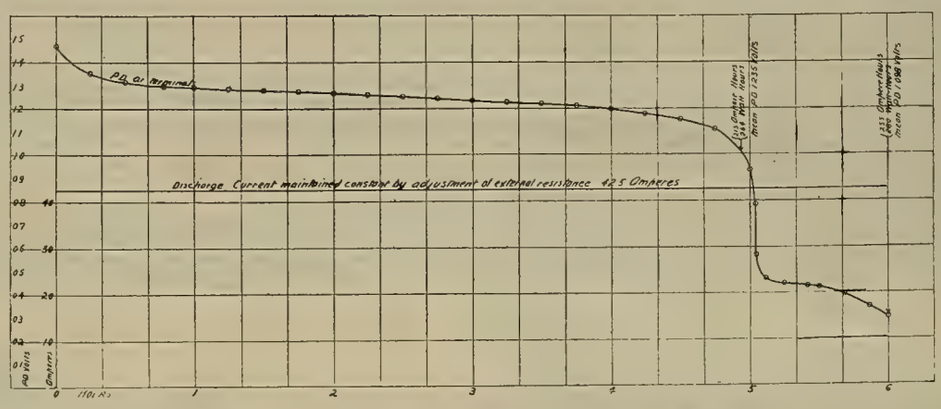
Diagrams are appended giving the curves of discharge of experimental cells.

Mr. Edison states that "the negative plate (nickel), either charged or discharged, can be removed from a working cell and dried in the air for a week without appreciably injuring it, and when the plate is finally replaced in the cell its charge is practically undiminished."

The positive (iron) plate, if similarly removed from the cell will be likewise uninjured, but it soon loses its charge by the oxidization of the spongy iron with accompanying liberation of heat and appreciable rise of temperature extending over a period of several hours. On replacing the electrode, however, in the the storage capacity is unaffected on recharge. s regards cost, Mr. Edison believes that after



Curves of Discharge of Edison Cell at Constant Current, 3 3-4 Hours Duration.



Curves of Discharge of Small Multiple Edison Cell Weighing Twenty-Five Pounds.

factory facilities now in course of preparation have been completed, he will be able to furnish the cells at a price per kilowatt hour not greater than the prevailing price of lead cells.

Having now considered the action and properties of the cell, a brief description may be given of the difficulties encountered in developing it.

The phenomenon of passivity has probably kept inventors from finding this cell in the past. Mr. Edison believes that of all the very numerous compounds of iron, and of which he has tried many hundreds, the particular compound which he prepares is perhaps the only one capable of being used.

If the dried hydrates or oxides of iron, native or artificial, are subjected to electrolytic reducing action in any alkaline solution, they remain inert and unaffected.

On the other hand, if finely divided iron obtained by reducing a compound of iron under the action of a reducing agent such as hydrogen or carbonic monoxide is subjected to electrolytic oxidation in an alkaline solution it is inert and cannot be oxidized. It assumes the well-known passive state.

The same difficulty of passivity affects the use of nickel or the negative element. Finely divided nickel, reduced from a nickel compound, remains inactive when subjected to electrolytic oxygen in an alkaline solution. The monoxide and the black oxide or peroxide are also inert. No oxide of nickel is active or can be made active by electrolytic action, and the peroxide does not act as a depolarizer.

Jeffrey Endless Picking Table.

The accompanying illustration shows one of the steel picking tables furnished the Mexican Coal & Coke Co., Las Esperanzas, Mexico, by the Jeffrey Mfg. Co., Columbus, Ohio.

These tables are about 4 feet wide by 50 feet long and are constructed of two strands of Jeffrey roller chain, covered completely with double-beaded plates which overlap each other so that there is no opening in the apron or table when traveling either on a straight line or around the sprockets at the end. The plates are securely riveted to the chain attachments, while the chain travels on a suitable track or runway.

In this construction there are no intermediate rollers or idlers required for supporting the table, either for the loaded or return side. To prevent the coal from rolling off at the sides of the table, and to dispense with the usual independent guards, additional overlapping end pieces are riveted to the ends of the plates, projecting about 6 inches above the table. This forms an open endless traveling trough about 4 feet wide and 6 inches deep, which is entirely self-contained. The plates are made of heavy steel and owing to the additional strength due to the double corrugations form a very stiff and at the same time comparatively light apron. These traveling tables can be supported in an iron or wood frame, while a floor can be arranged at either side for the pickers.

This same type of apron is also used for handling ore and other substances and can be made in different lengths, widths and weights for a variety of purposes.

The Reno District, Nevada.*

The Reno district, or, as it is more commonly termed, the Reno Star district, is the newest but undoubtedly the most valuable mining district in Washoe county at the present time. Included in this district are all the mines lying to the east of Reno for a distance of about 12 miles. Far and away the most prominent and most valuable of these locations are those owned and operated by the Reno Star Co., consisting of George Wedekind and sons. The Reno Star mine, which is about 6 miles east of Reno, was first located about five years ago, and although some little assessment work was done on it, the new vein was not discovered until about the first of April, 1900. The country rock in this locality is andesite, and the outcrop, which is much stained with iron (from which it derives its name—iron porphyry) may be traced for a distance of some 8 miles northeast, keeping the same general appearance and formation as in the vicinity of the Reno Star mine. Part of the country rock near the mine is an agglomerate. The lode as thus followed is porphyry and lies under a heavy iron-porphyry blanket which dips to the west.

The ore is cerargyrite, a silver chloride commonly termed horn silver, together with free gold. Up to the present time the ore has been followed for a distance of about 90 feet on the vein; thence another tunnel has been run off to the right for about 30 feet. The deepest point of the mine is not more that 40 feet from the surface. As the ore is very soft, picks alone have been used in digging it out, very little, if any, blasting be-

* Ralph S. Stubbs in Nevada State Journal.

ing necessary. In opening this mine, ore was discovered within 6 inches of the surface. As work on the incline continues, the ore seems to remain the same average quality and runs from $60 to $1000 per ton.

The first shipment of ore from the Reno Star mine was made in April, 1900, and went to Salt Lake. The second and third shipments went to the Reno Reduction Works, and all other shipments have been made to the Selby Smelting Works of San Francisco. The ore, owing to its composition, may be smelted direct.

Crossing the Reno Star claim, and lying to the west of it, is the property of C. B. Bell. The claim exists on an agricultural patent and a lawsuit is at the present time pending beween the owners of the Reno Star claim and Mr. Bell.

On this claim a shaft has been sunk to a depth of 115 feet, and on April 3 last ore was first struck. The ore is the same in appearance as in the Reno Star mine. Between April 3d and April 10th fifty tons of ore were taken out of the Bell claim, its valuation being estimated at about $10,000. Mr. Bell is pushing his work very rapidly and expects in the near future to erect a mill on the ground, which will greatly facilitate the handling of the ore.

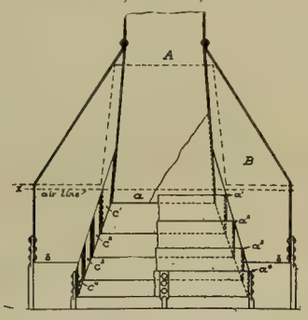
Since ore was first struck in the Reno Star district all of the land in that vicinity has been claimed and located, and much active work is now being done. Among these claims is the U. M. Slater mine, owned by U. M. Slater, Senator Flannigan and James Sullivan. Assays on ore from this claim have given very fair results and the owners are making preparations for extensive work.

Mining and Metallurgical Patents.

Patents Issued June 11, 1901.

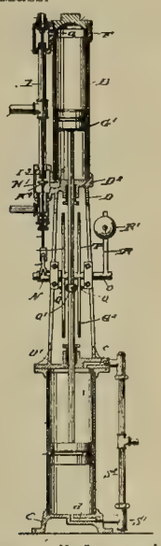
Specially Prepared for the MINING AND SCIENTIFIC PRESS.

SEPARATOR FOR HYDRAULIC AIR COMPRESSORS.—No. 676,016; W. O. Webber, Boston, Mass.



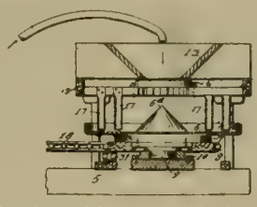
A downflow pipe having an enlarged lower end surrounded by one or more vertically disposed separating plates, the spaces between plates being of proportionately decreasing areas, each less than that of downflow pipe, upper edge of each succeeding separating plate projecting above lower edge of next smaller plate which it surrounds, and lower end of downflow pipe and its surrounding plates projecting vertically downward into an inverted vessel having its lower end open.

HYDRAULIC AIR COMPRESSOR.—No. 676,266; L. E. Mitchell, Boston, Mass.



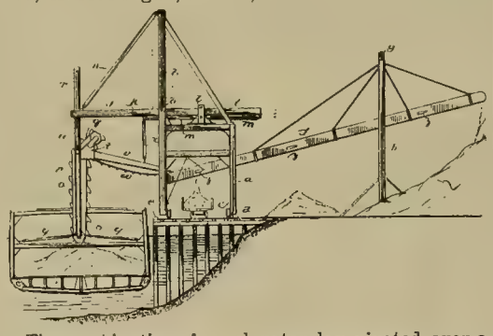
A hydraulic-power cylinder, a piston reciprocating in cylinder, valve chests opening into cylinder at ends thereof and having waste outlets, a supply connection between valve chests and having slotted ends extending into chests opposite waste outlets, a reciprocating plunger valve having a plurality of plungers for slotted ends of connection, to alternately open and close them to the chests, valves for alternately opening and closing waste outlets, means for actuating piston valve from piston rod of piston, comprising a shaft having a lug thereon, a double arm secured on shaft and engaged by a crosshead on piston rod, to impart a rocking motion to shaft, a crank arm loose on shaft and having spaced shoulders adapted to be alternately engaged by lug, a link connecting crank arm with valve stem of piston valve, and a weighted arm on shaft.

CONCENTRATOR.—No. 676,388; J. Mellein, Denver, Colo.



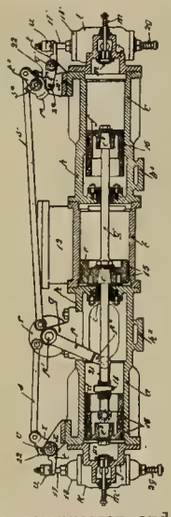
The combination with a suitable frame, of a horizontally, revoluble pan whose bottom is provided with a drum having a sprocket wheel, and terminating at bottom in a journal engaging bearing of frame, the pan being provided with a conical center, a hopper mounted above pan, a top frame mounted on main frame, a series of radially disposed bars located between pan and hopper, their outer extremities being attached to frame, a ring attached to inner extremities, depending agitating arms attached to bars and projecting into pan, an operating chain connected with sprocket on drum of pan, means for actuating chain, pump operated by chain-operating means, conduit leading from pump to discharge water into pan, and shovel or plow attached to one end of depending agitating arms, and projecting into pan near its outer edge to throw out gangue as pan rotates.

MEANS AND MECHANISM FOR UNLOADING ORE, COAL, ETC., FROM VESSELS TO DOCKS, CARS, ETC.—No. 676,075; A. McDougall, Duluth, Minn.



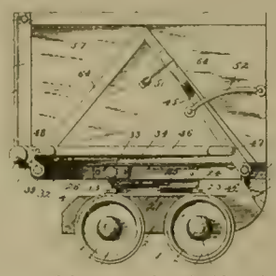
The combination of an elevator leg pivoted over a vessel, an endless bucket elevator within leg, means contained within leg for operating elevator, means for supporting leg in a vertical position, means for raising and lowering leg, a conveyor pivoted to leg, and connecting outtake of leg to a fixed discharge, flexible means for supporting conveyor in a normally horizontal position, and means for swinging intake of leg over cargo, such means operating simultaneously with elevator operating means.

COMBINED AIR COMPRESSOR AND EXPLOSIVE MOTOR. No. 676,349; F. H. Blasse, Paris, France.



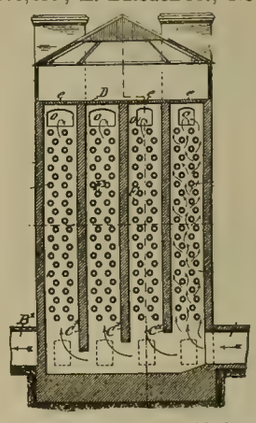
A combined air compressor and explosive motor comprising two single-acting explosive cylinders a and c having inlet and exhaust ports with valves controlling same; a double-acting compressor cylinder b, placed between motive cylinders; one piston rod g on which pistons d and f of motive cylinders and piston e of compressor cylinder are mounted; the rod p connected to piston rod; rock shaft p′ actuated by rod p; crank disks r mounted on shaft; two pairs of pitmen s, s′, pivoted each to one of disks, and mechanism actuated by pitmen for controlling valves.

DUMPING CAR.—No. 676,278; A. Roesgen, Leadville, Colo.



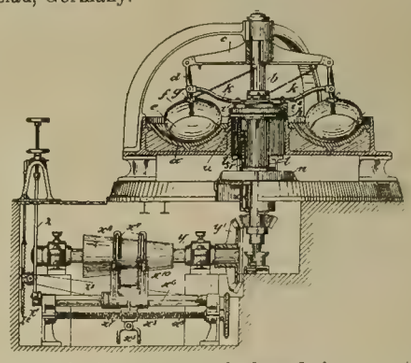
A truck comprising a pair of side pieces each of which is provided with a series of axle-receiving bearings and also having one of its ends projecting upwardly, outwardly extending wheel guards carried by side pieces and arranged adjacent to bearings, inwardly projecting hoods also carried by side pieces and also arranged adjacent to bearings, axles mounted in latter, inwardly extending lips carried by side pieces and disposed above hoods, a covering plate mounted upon side pieces, bolts passing through plate, lips, hoods and axles, a saddle piece connecting upwardly projecting ends of side pieces, and an inclined web connecting other ends of side pieces, a body mounted on covering plate and normally resting upon saddle piece, a hook carried by body and adapted to engage truck for locking body in engagement therewith, and a lever for operating hook.

CONDENSER FOR FUMES OF METALLURGICAL FURNACES.—No. 676,380; E. Balbach Jr., Newark, N. J.



A tower-shaped structure, provided with longitudinal and transverse partition walls, an inlet flue at one side, an outlet flue at opposite side of tower, openings arranged alternately at upper end and lower ends of longitudinal partitions, air spaces arranged in opposite walls of tower, pipes passing through longitudinal partitions and connecting air spaces, air inlet openings into air space in one end wall and an air outlet at upper end of air space of opposite wall.

BALL GRINDING MILL.—No. 676,254; C. Hofmann, Breslau, Germany.



The combination of a trough-shaped ring, a rotary drive shaft within it, supporting arms extending radially from shaft, depending links pivoted to arms, grinding balls suitably supported by links, and means positively connecting links with drive shaft for imparting an oscillatory movement to links and balls.

IN a British patent issued to Herr Kugel of Berlin is described a method of depositing nickel electrolytically in layers of such thickness that the product is equivalent to rolled nickel in its mechanical properties of toughness, durability and ductility. The method is to acidify the nickel solution with a mineral acid which is unalterable by the electric current. Such an addition usually spoils the bath, causing the deposit to flake off, but this difficulty is overcome by keeping the electrolyte at a temperature over 30° C. Under these circumstances a homogeneous non-crystalline metal is said to be deposited and may be put down in sheets of any required thickness.

MINING SUMMARY.

Specially compiled and reported for the MINING AND SCIENTIFIC PRESS.

ALASKA.

JUNEAU.

Consulting Engineer Allen, who has been making an examination of the Sheep creek water power for San Francisco capitalists, who will take up the $75,000 bonds to construct the power plant, has returned to San Francisco to report. The Sheep Creek Power Co. is a local company, headed by F. Hammond, who have a ten-year contract to furnish power and light for the Ready Bullion mine at Treadwell. It is also the object of the company to furnish wholesale electric power in Juneau. It is expected that construction of the plant will be started as soon as the engineer's report is approved in San Francisco.

RAMPART.

Big Minook, heretofore called winter diggings, will be worked by hydraulics and ground sluicing this summer. The continuous pay found from 17 below to 80 above has decided the mine owners to work the benches by water from upper Minook and tributaries.

Slate creek from 3 above to 7 below will be handled by flumes. As a prospect the ground is very shallow, in only a few instances being more than 3 feet deep and nuggets weighing $40 are occasionally picked up on the rims.

PORCUPINE.

Dalton & Co. have put in a flume, carrying the whole of Porcupine creek. It is 750 feet long, 20 feet wide and 5 feet deep, and the company will mine the bed of the creek. H. Larsen is Supt.

Clark & Biglow, on No. 1 above, have a flume 350 feet long, 18 feet wide and 4 feet high. J. Biglow is Supt.

On No. 1 below hydraulicking has commenced on the high bars. A. Smith is Supt.

The Calhoun Co. on McKinley creek are working on the pay streak and expect a large cleanup.

Hall & Chisholm on McKinley have put men to work on their property.

Voget, Myers & Martin have put in a solid stone ditch at considerable cost and are now ready to develop their claim.

There has been over $60,000 worth of machinery placed in position on Porcupine and McKinley creeks this season.

ARIZONA.

In 1899 J. S. and R. Cary, E. and F. Smith, A. Wilfley and other Denver men bought the Pride of the West mine, in Washington Camp. The ore carries copper, zinc blende, garnet and considerable quartz, besides from 2% to 4% of lead. In the treatment scheme developed by Mr. Wilfley the ore is first roasted sufficiently to coat the particles with oxide of iron. After cooling, they are passed under the poles of an electric magnet, taking out the greater part of the copper, leaving the tailings carrying zinc blende, garnet, quartz and galena. The tailings were then passed over Wilfley tables, which take out the galena with nearly two ounces of silver to each unit of lead, making a product of lead-silver ore containing 50% to 60% lead and 100 to 120 ounces silver to the ton. The tailings are then subjected a second time to the magnets, which takes out the remaining copper, garnet and zinc blende, which are set aside for further treatment, and the residue again passed over Wilfleys, the remaining galena being taken out. The result is a very clean extraction.

COCHISE COUNTY.

The combination shaft at Tombstone is now timbered and sunk to a depth of 60 feet. The sinking is at the rate of 5 feet per day. Thirty men are at present employed on the work.

SANTA CRUZ COUNTY.

H. A. Smith, manager of the Ella No. 2 copper mine, in Washington district, owned by the Standish M. Co. of New York, is arranging to commence extensive development work on the mine.

Near Patagonia, Hartwick & Schwarty are developing a copper property. They have a 6-foot ledge—2 feet upon the hanging wall of copper glance, which will yield 35% to 40% of metal, the remaining 4 feet high-grade sulphides.

CALIFORNIA.

AMADOR COUNTY.

The Bunker Hill shaft is now down over 900 feet.

The Keystone mill at Amador City is to be ready for crushing by October.

Alvinza Hayward has bought the Pacific, Indiana and Phœnix mines at Plymouth, under judgment obtained against corporations who were the owners.

W. W. Worthing of Stockton, the prospective purchaser of the Rhetta mine at Plymouth, and C. Kretcher, the owner of the mine, have arranged the terms of the final payment for the mine.

BUTTE COUNTY.

It is reported that the Little Hope mine, near Mountain House, has begun operations again, and that the Kellogg mine in the same neighborhood will soon be reopened.

CALAVERAS COUNTY.

The McSorley Bros. have struck excellent ore in the Emma mine at Campo Seco. The shaft is down 130 feet and the ore was struck crosscutting the ledge. The ore shows bunches of good sulphurets and visible gold and is almost in appearance the same as ore from the Gwin mine.

EL DORADO COUNTY.

Mrs. Atwood of Boston has recently bought a large interest in the Laine mine and will personally conduct the operations.

A contract has been let to sink a shaft on the Shaw mine, at El Dorado, now 100 feet deep, to a further depth of 500 feet.

NEVADA COUNTY.

Dr. Sherwood and Mr. Kamp of San Francisco have recently examined the P. Boyle drift claim at Excelsior Hill, with a view of opening it up.

PLACER COUNTY.

A. Bordeaux, vice-president and general manager of the Ralston Divide G. M. Co., has gone to Paris, France, to make a report to the company. He expects to return some time in September and resume operations at the mine.

PLUMAS COUNTY.

J. Montieth, of Dubuque, Iowa, is at Quincy to erect hoisting works and a pumping plant on ground north of the Bell Quartz mine, to prospect by a shaft a gravel channel running through the Newtown slope of the hill.

The Glazier placer claim on the north fork of Feather river has been bought by San Francisco people, represented by Rev. J. H. Webber, for $10,000.

W. K. Aldersley of Bangor, Butte county, has men at work on the Harris quartz ledge, near Poorman's creek.

SHASTA COUNTY.

J. & W. Blagrave, who have leased the old Washington mine at French Gulch, have uncovered an ore body from 7 to 12 feet wide going from $25 to $35 a ton. The ore will be hauled to Keswick for reduction.

SIERRA COUNTY.

G. Chase of Chicago is at Downieville inspecting his mining properties, one of which is known as the Central California. There is a fine ledge in this mine and there are good facilities for working the ore. It is the intention of the company to begin active work on this mine soon. The other property owned by the company is a drift claim. Quartz taken out recently has paid well.

The hydraulic mine at La Porte, operated by a Boston company, has resumed work after three weeks shutdown by reason of an injunction by the Anti-Debris people. They are now working under a stipulation.

The Chinese company renting the John Doherty claim at Howland Flat are working a large number of men, and are reported to be on good pay.

It is reported that negotiations that have been pending between the Pacific G. M. Co. and outside capitalists have resulted in the sale of the company's gravel mine near St. Louis. The sale was made through J. Thomas of La Porte, the price paid being about $30,000.

The Thistle Shaft Co. are working on Slate creek, near the mouth of Wallace creek, grading for buildings and wagon roads and running their main tunnel, which is now in about 100 feet. It is a 10x8 tunnel with double track. Three Burleigh drills and an air compressor are being installed. It will require over 6000 feet advance to reach the channel, and over a year's time.

SISKIYOU COUNTY.

The Wild Irishman ledge on Mathews creek, near Cecilville, owned by Bowerman, has been bonded to a San Francisco company, who have several men, under Supt. G. Gerkin running a new level to see if the ore in sight goes down.

TRINITY COUNTY.

The Sweepstake hydraulic placer near Weaverville has been sold to E. V. Douglass, W. P. Douglass and T. S. Lewis of Philadelphia. R. J. Anderson, M. E., of Idaho, represented the buyers. The price is variously reported from $3,000,000 to $6,000,000. The purchasers have taken possession and have let contracts for the construction of pipe and ditch lines aggregating about $500,000. Frank H. Hall, one of the sellers, is in general charge of the new construction. The claim adjoins the La Grange, sold some years since to a French company for a large sum, but is much richer, the average gold content of the gravel being said to be more dollars a cubic yard in the Sweepstake than cents in the La Grange. The Sweepstake channel is a remnant of the first or oldest channel, and is probably of Cretaceous age. Other small remnants of a river system of an age to which this probably belongs have been mined on summits and benches of the higher Klamath mountains. It is a notable fact that the appearance of the gold is similar to gold mined in the Klondike, and different from the gold of Weaver basin, which originally was part of the deposit in the Sweepstake channel before its erosion.

The Lappin mine, adjoining the Brown Bear at Deadwood, is shipping rich ore to the Keswick smelter.

W. S. G. Todd of Weaverville has sold to F. Pichon a half interest in a quartz mine on the North Fork of Trinity river.

A very rich strike is reported to have been made in the Black Diamond quartz mine on Canyon creek, owned by Dr. W. H. LaBaree and J. A. Morris of Weaverville. The owners working on the property have run in a tunnel over 104 feet. Where the ledge is cross-cut it is over 3 feet wide, carrying free gold and tellurium. On the location are three parallel ledges, carrying the same tellurium indications. The rich strike spoken of was made on the upper ledge and the rock is encrusted with gold.

T. F. Loughborough of San Francisco has bonded 5000 acres of supposed gold-bearing ground, which can be exploited by dredger, in Hay Fork, and expects to begin prospecting with a Keystone driller within thirty days.

The Fortuna Copper Co. has been incorporated in Humboldt county to work mines chiefly in Trinity county, with its principal place of business at Fortuna, Humboldt county. The incorporators are C. Swett, I. H. Hunter, T. L. Legg, D. Mudgett, A. Rolley, P. J. Mulley, M. J. Swortzel.

The Brown Bear Co. are still sinking and raising for the shaft on their ledge at Deadwood.

Reeves, Davidson & Co. are taking out rich rock from the old Shafter mine and have run 100 tons through the Brown Bear mill.

YUBA COUNTY.

Ten tons of rock from the Cabbage Patch mine near Wheatland have been hauled to a Grass Valley mill for a test mill run. The ore shows well in free gold and sulphurets. A quantity of the rock has also been shipped to the smelter. Tests already made have paid from $20 to $50 per ton. The mine is owned by R. Vincent and others of Grass Valley, but is bonded to W. Foote, E. Roberts, R. Quick, W. Eddy and W. Billings.

TUOLUMNE COUNTY.

The Olesen mine, near the Solambo, at La Grange, is being opened up. The dump is being worked over and shipped to Selby's. The ore formerly went 37% copper, 16 ounces silver and $19 gold per ton.

C. Claytor of the Gray Eagle mine at American camp says the new shaft is down 75 feet. The hoist has been moved from the old shaft. There is a 2-stamp mill on the mine. M. Page is Supt.

Operations are being pushed on the Goldwin Co.'s property, managed by Capt. McClintock. The main shaft is down 500 feet and the ore shoot is growing richer. The rock shows free gold. The new mill is practically completed.

Supt. Restano, of the Golden West mine, situated on the Comstock ranch, reports the building of the mill to be going on rapidly. A new shoot of ore has been uncovered in the mine, showing 3½ feet of quartz in which gold is visible in every part. The old shoot has over 5 feet of good milling rock.

The bond on the Street mine, at Columbia, was closed last week and the property bought by R. Kinsman, who will make extensive improvements on it. Sinking in the shaft, now down 300 feet, has been stopped and a drift is being run on that level. Oil is to be substituted for wood for fuel, a 3000-gallon tank having been ordered. An air compressor will be added to the plant and air drills put in the mine.

The Preston Hill M. Co. has incorporated to operate the Preston Hill quartz mine, at Jamestown. The directors are S. Silliman, Oakland; E. C. Dailey, T. K. Code, C. F. Humphrey, San Francisco; E. T. Hale, Jamestown. The last named is Supt.; capital stock, $500,000. The formation in the tunnel at the mine, now in 148 feet, is changing into a heavy mineralized slate, showing some quartz of favorable appearance.

In the west end of the Crystalline mine, at Jamestown, a 3-foot vein of ore of good grade, carrying copper, silver and gold, has been struck. This character of ore is unusual on the mother lode. The Tuolumne Electric Power Co. is at present stringing its wires to the mine and a transformer house is being built near the old works. Electricity will supersede steam at this mine.

The new 10-stamp mill on the Duleak mine, situated on the south bank of the main Tuolumne river, has been started up. On the vein is a shaft 150 feet deep, at the bottom of which drifts have been run north and south 200 feet, exposing a well-defined vein averaging 7 feet in width and carrying considerable free gold. The mine is owned by a San Jose stock company, of which W. Graham is Supt.

The Pearl M. Co., M. Tait Supt., is developing its mines near Confidence slowly but systematically. The crosscut tunnel has been driven in 130 feet, and is estimated to be within 30 feet of the Pearl vein, which will be cut about 125 feet below the surface.

A wagon road is being constructed from a point on the Buchanan road, near the Galo Ralph ranch, to the Lost Fox mine. Supt. M. Bulski is also having three-fourths of a mile of flume built to carry water for power development. The mine will then be equipped with both steam and water power. Immediately on the completion of these improvements, sinking will be resumed.

COLORADO.

BOULDER COUNTY.

Work is progressing very steadily in the Wall Street district, scarcely any of the producing mines are idle, and only these for improvement, putting in machinery or awaiting its arrival. The following are in full working order and producing ore now: The Melvina, Ingram, Richmond, Golden Eagle, Emancipation, Inter-Ocean, Monongahela, Yellow Pine, Logan, Caroline, Dime, Dirigo, Concord, Gillard, Gold Lode, Lucky Star, Slide, Tamborine, Zophar, Franklin, Wood Mountain No. 1, South American, Smoky Hill, Gladys A., L. C., Phœnix, Cross, Daisy, Ethel, Second Hold, Klondyke, Cold Spring, Elkhorn, Wall Street, Little Giant. Others are doing development.

It is stated that over $50,000 will be expended in development on the Victoria mine, at Salina. The No. 2 shaft will be sunk to a depth of 800 feet.

The Revenge Co., at Eldora, have struck a high-grade ore body in the 280-foot level. It is gray copper and gave assay returns of 25% copper and 2600 ounces silver to the ton. The shaft is now 300 feet deep.

Several copper leads have been discovered in Sunshine canyon, near Boulder, by J. L. Bell, who has done some development work. I. E. Alcorn is a part owner and they have recently bonded the Avoca and Mancipation claims to a Denver party, who commenced work on the 10th inst.

The first shipment of 1901 of tungsten ore has been made to the Krupp Steel Works, Germany. The ore is from the Combination mine, in Grand Island district, under lease to D. W. O'Keefe. A sample of the shipment assayed 56.20% of tungstic acid and a trace of sulphur, which makes the material very desirable for use in steel works. The concentrates are worth $150 per ton when the grade is as high in tungstic acid as this shipment. The ore is also found at Yankee hill, Gilpin county, and in the Silverton district, San Juan county.

CLEAR CREEK COUNTY.

The Ora Verde M. Co., operating the Florence tunnel at Yankee, propose to erect ore bins at once. Manager Goodyear reports that he has struck the Ross lode, for which he has been driving the tunnel, and is near the rich shoot of ore uncovered in the shaft, which is cut by the tunnel at a depth of 450 feet.

It is said that work will soon be resumed on the Owsley group, in East Argentine, by Schauer & Co., who have it under bond.

The Salisbury mine, located near the Stanley, Idaho Springs, is working under lease to King & Foster, who have twelve sub-lessees. From the 70-foot level very fine copper ore is being extracted. It is the intention to unwater the mine below this level.

C. A. King, who has charge of the J. Warner mine in Gilson gulch, Idaho Springs, is driving a crosscut from the bottom of the 70-foot winze to cut 100 feet deep a vein carrying good surface values.

FREMONT COUNTY.

At a meeting of the stockholders of the Rocky Mountain Smelting Co., held at the office of the company in Denver, it was decided to increase the capital stock from $750,000 to $1,250,000 and to double the capacity of the plant.

The Brock M. & M. Co. has been incorporated at Florence. It owns 125 acres of mining property in one body, situated in the Sangre de Christo range, 6 miles east of Villa Grove, consisting of eleven claims, mill site and water right. W. H. Brock of the company, working in the Mountain

Lioness, on a prospect trench for about 125 feet in length and 8 feet deep, has figured up the first month's operating expenses to be $380, with $720 worth of ore on the dump to offset it.

GILPIN COUNTY.

J. A. Emory and E. A. Moulton of Boston, Mass., for Boston parties, have bought ground at Golden for, it is said, $10,000. The ground was bought for a concentrating mill site. Work on construction is to begin immediately. The new plant will be of 150 tons capacity, built in two sections of seventy-five tons capacity. The company intend to run it as a custom mill.

The Gold Brick lode, east of the Colorado-Carr mine, in Enterprise district, owned by Schultz of Black Hawk, has been bought by the Colorado-Carr Co. for $7000. The company has made a survey for its aerial tramway from the Carr to the 50-stamp slow-drop mill on Clear creek, in the lower portion of Black Hawk. The added property when opened will insure ore to keep the full capacity of the mill employed.

HINSDALE COUNTY.

The Hanna Co., operating the Moro and Ajax mines, have opened between 6 and 8 feet of ore in the Moro property.

LAKE COUNTY.

O. C. Bartholomew, manager of the Sedalia mine of Leadville, says the production of the mine is keeping up to the standard and arrangements for sinking the shaft an additional 300 feet have been concluded, which will make it 1000 feet, where it will cut the sulphides known to exist in that section of the camp.

A. H. Webber of Denver has completed arrangements for work on an old property in Tennessee park, Leadville. He says that the group was worked in the 80's and produced between 5000 and 6000 tons of ore that averaged better than $2 per ton in gold. The principal work was done on the Lucy L. claim, which was equipped with a mill, and by reconstructing the mill with modern appliances the mine can be made to pay.

Work on the Hummer property, Leadville, G. M. Mitchell, Supt., has started, and some lead ore has been opened in the upper level. The strike of sulphides in the Resurrection mine just north gives assurance of finding them in the Hummer. A new shaft is under consideration and work on it may be started.

MINERAL COUNTY.

A rich body of ore has been opened in the shaft being sunk from the Nelson tunnel at Creede. At a depth of 80 feet from tunnel level the vein was opened and for 3 feet width assayed sixty ounces to the ton in silver. The strike is 1500 feet from the apex of the vein, the greatest depth ever attained in the district.

The Bachelor is making a steady output.

Shipments from Creede so far this year have been about 7000 tons per month and the total tonnage since the first of the year has been 36,903 tons.

The ground has been prepared for the erection of the Big Kanawha mill at Creede. The mill will probably be completed by October 1.

OURAY COUNTY.

J. W. Benson, manager of the Camp Bird mine, at Ouray, has ordered twenty more stamps to the mill, making 100 stamps, with a daily capacity of 300 tons, equivalent to a monthly output of $300,000.

The Camp Bird Extension Co.'s plans include a tunnel, starting near the Mount Lion tunnel near Ironton, and going under Spirit basin, through Hayden mountain to Imogene basin. This tunnel will cut a large part of the rich veins in the company's many claims. Ironton will be the base of operations.

A strike has been made in the Growler mine, Red Mountain district, owned by S. L. Fleitus, now operated under a bond by H. Smith of Ouray. A body of ore 2 feet wide has been opened, brittle silver predominating and the values running from 300 to 6000 ounces of silver to the ton.

SAGUACHE COUNTY.

The Cripple Creek & Idaho M. Co., E. C. Whitney Supt., who bought five claims near Crestone, with water right and mill site, has men at work on a crosscut tunnel.

SAN JUAN COUNTY.

Work has been started on the Champion No. 2 mine, on Sultan mountain, recently bought by J. C. Doucey, W. H. Beemer and W. H. Gamble of Detroit, Mich. The ores will be treated at the local smelter.

The Anti-Periodic's rich ore, recently encountered, is now reported to run $800 per ton, and a talc streak in the vein averages 1500 ounces of silver.

The Elizabeth M. Co. of Pueblo, with O. H. P. Baxter at the head, has bought seven claims located between Poughkeepsie gulch and the west fork of the Animas river, and is making arrangements for the prosecution of an extensive system of development.

New machinery is being installed on the Evening Star mine of the Sunlight Co. in Mastodon gulch, of which J. J. Yeckel of Denver is president.

SAN MIGUEL COUNTY.

The Crown Point group at Ophir, recently bought by the Milwaukee-Ophir Co. for $40,000, has recently opened a body of first-class ore. Eight men are taking out four carloads per week of smelting ore that carries 60% lead and gold and silver, making its value $100 per ton.

TELLER COUNTY.

The shaft of the Gold Coin mine is now down to a depth of 1125 feet and a station will be cut. The company is now hoisting good ore from the 850-foot and 1000-foot levels. The vein cut in the 850-foot level is looking well.

D. Heaton, of Victor, has a three-year lease on the Mary Alice claim, which contains about five acres and lies adjacent to the Independence and Portland, on Battle mountain. It has a 425-foot shaft and some laterals. The former operators reached two veins of good size that assayed below pay. Mr. Heaton proposes to sink another 100 feet and crosscut. He will install a 10x14 hoist.

Possibilities of productiveness in Stratton's Independence are now considered greater than they were at the time of the sale by Stratton to the Venture Co. In the old workings the ore bodies exposed have been increased during the past few months. The management is reported to be negotiating for the installation of heavier machinery for hoisting to augment the present plant. With the increase in power it is calculated that the production may be increased somewhere between a half and a third. During May the output was 6300 tons, the gross value of which was about $250,000.

Work is to be started on Mollie Dwyer ground at Cripple Creek by the company through the Pointer workings. Work has been suspended for some time in order to start sinking from the 525-foot level of the Pointer.

Bunches of sylvanite are being found in the eleventh level of the Isabella, at Cripple Creek, and it is believed that the mine is coming into bonanza again. Ore has been opened in several places. In the fourteenth level a 3-foot vein, running from one ounce to twenty-eight ounces, has been found. G. D. Kilborn is the general manager of the mine.

IDAHO.

BOISE COUNTY.

The Twin Sisters mine, at Centerville, is being equipped with a 5-stamp mill. The holdings embrace two veins 500 feet apart. The work opened is through a 250-foot shaft, with 300 feet of work on the veins. E. F. Blain is superintendent.

Near Placerville a 5-stamp mill is operating on the Mineral Hill.

The Last Chance, near Quartzburg, is producing, the ore being milled. H. Barry is manager.

The dredgers at Idaho City are operating successfully under the management of Rupert Winters. The two dredgers handle about 4000 yards of material daily.

The North Star, 12 miles from Boise, in Shaw's mountain, is operating with a 10-stamp mill, with plates and concentrators.

The Viola, 15 miles northeast of Boise, is operating with a small force, and is in gold ore.

The Twin Springs placers are doing but little work at present.

The Iowa, at Quartzburg, is operating again. The Iowa, North Star, War Eagle and others are under the management of H. L. Woodburn.

Boise, Idaho, June 5.

CLEARWATER COUNTY.

J. R. Greer of Oro Fino says that Clearwater county has seven stamp mills in operation and four more are now en route, one of these being twenty stamps. Besides this there are three hydraulic elevators in operation, each with a capacity of 1200 yards of ground per day. There are about 200 placer mines working in the new county, all using giants. Generally the ground is very good, much of it running from $1 to $1.50 per yard, this being true of all the small giant propositions, and often on the hydraulic elevators they find the same rich material.

KOOTENAI COUNTY.

W. L. Wester of Colfax, Wash., reports active work in the St. Maries river placer district. R. Neill, owner of the discovery claim and the one above it, is making fine cleanups in mining on an extensive scale. There is a plan being considered to build a flume from the St. Maries river for water for hydraulicking. D. C. Corbin, who bought the claim below the discovery for $4000, is opening it with a full equipment and a force of men. There are from thirty to forty prospectors in the district and a number of good prospects have been discovered.

SHOSHONE COUNTY.

The Bunker Hill & Sullivan M. & C. Co. has brought suit in the U. S. Court against the Last Chance M. Co., the Shoshone M. Co. and the Empire State-Idaho M. & D. Co. for $74,000 damages. It is alleged that the defendant companies have tunneled into the Tyler lode, owned by the Bunker Hill & Sullivan Co., and appropriated ore to the value of $74,000.

It is reported that at the recent conference between the Cœur d'Alene silver-lead mine owners and the American Smelting & Refining Co. managers in New York recently no agreement was arrived at. The difference is said to be in the smelting company insisting that they alone should fix the price of the lead. The mine owners are said to be considering the possibility of constructing their own smelters and refinery if the smelting company does not modify its proposition.

P. Clark and his associates have brought suit against C. Sweeney, the Buffalo Hump M. Co. and the Empire State-Idaho M. Co. Clarke alleges that Sweeney unlawfully broke into two claims adjoining the Tiger-Poorman mine in Idaho, explored them with diamond drills, extracted ore and paid dividends, and then by intrigue, falsehood and misrepresentation induced the plaintiffs to sell for $4000 property which was worth $1,000,000, saying they wanted it only for the surface rights. Those associated with Clark are B. C. Kingsbury, J. Clark and J. P. Harvey, while F. R. Culberson is joined with Sweeney as defendant.

WASHINGTON COUNTY.

R. T. Woliston, superintendent of the Brown-Stemwinder group in Health district, near Weiser, says he is completing the buildings and making other improvements, and will increase the force in the mine. A road from the town, 1½ miles in length, is nearly completed.

MONTANA.

CASCADE COUNTY.

At the stockholders' meeting of the Diamond R. Co., held in Great Falls, it was decided to consolidate with the Broadwater group, near Neihart, owned by L. S. McLure and O. D. McLure, and to form a new corporation capitalized at $1,500,000. The two properties are valued at about $1,000,000 each and will be consolidated on an equal basis. Final arrangements for the consolidation are being made. The Diamond R. Co. addition to its concentrator, increasing its capacity to 300 tons daily, is completed and in operation. The tramway for carrying ores from the Broadwater group to the concentrator, erected at a cost of $30,000, is also in operation.

FERGUS COUNTY.

On the 6th the Eagle group, in the Gilt Edge district, was bonded by H. T. Kendall & Co. for one year at $20,000. The group consists of five claims, joining the Central Montana Mines Co. on the south and on the eastern slope of the Judith range. The claims are undeveloped, but show ore, a red vein filling in a fault in the limestone. Ores from the claims average $8.20 per ton. Development work has been commenced, which, if satisfactory, will result in the building of a mill.

The bullion product of the Central Montana Mines Co. for May was 1043 ounces; valuation, $18,227. Ore crushed, 3368 tons, showing average values extracted a little less than $6 per ton. A receiver has been appointed to operate the property pending litigation. During May the Great Northern M. & D. Co., at Gilt Edge, crushed 4400 tons; bullion product about $34,200.

Lewiston, June 12.

FLATHEAD COUNTY.

The Cabinet Queen M. Co. has resumed work on its mine on Grouse mountain, 14 miles from Troy. The claims of the company are the Little Spokane, Cabinet Queen and Little Butte. About 300 feet of tunneling has been done on the Cabinet Queen. The ore is principally galena, but sulphide of copper and arsenical iron are found in it. The iron carries some gold. It is a concentrating proposition.

LEWIS AND CLARKE COUNTY.

A strike of copper ore has been made on the Red Bird claim on Greenhorn gulch, 12 miles west of Helena, by Punches & Co. The mine was started as an iron mine to supply iron flux to the East Helena smelter. The ore, in addition to the high percentage of iron, carried gold values. Seven cars of ore had been shipped and a shaft sunk to a depth of 80 feet, when a 10-foot wide vein with a pay streak of 20 inches of high-grade copper ore was discovered.

C. W. Clark and others of Butte have bonded for $50,000 forty acres in Helena, adjoining the Kenwood mine, which they are now developing. This gives them under bond 160 acres, covering the same vein. The last bond is taken from H. M. Parchen, who less than a year ago gave a bond for $600 on the same tract and engaged in litigation to break the deal when he found it was mineral land.

MADISON COUNTY.

The Blackstone M. Co. has been incorporated by F. Trainer, A. Gray and E. J. Schwefel, capital $10,000, to mine in this county.

MEAGHER COUNTY.

A. Ely of Chicago, Ill., and P. Ely of Cleveland, Ohio, have been at Copperopolis, arranging to start development on their claims in that camp.

SILVER BOW COUNTY.

The official tabulation of the earnings of the Butte district mines, compiled from the annual reports of net proceeds, shows earnings as follows:

Name.	1901.	1900.
Anaconda	$5,069,071 61	$6,228,655 25
Boston & Montana	7,042,303 68	6,073,153 34
Butte & Boston	586,053 72	325,044 00
Montana Ore Purchasing Co. (Heinze).	1,250,000 00	400,000 00
Colusa-Parrott (Clark)	245,400 00	325,044 00
Lexington	6,503 00	677 21
Snohomish & Tramway	53,301 00	79,800 00

No reports have been received from the Parrott, Speculator, Washoe and Colorado companies. The Montana Ore Purchasing Co. and Boston & Montana companies have reported their earnings only and do not go into details as to the cost of operations, while the other companies make affidavit to every cent of money received through sales of metals and all expenditures.

During the year the Anaconda Co. mined 1,276,896 tons of ore at a cost of $5,069,071. It cost $191,534 to transport to Anaconda, $5,288,720 to reduce it, and $2,007,415 to market. During the year the company expended $4,785,399 for new machinery. Its gross proceeds were $18,128,558.51. The Butte & Boston mined 214,310 tons of ore. Its cost of mining was $969,047; transportation, $41,019.10; reduction, $551,344. The company expended $631,531 for machinery and $436,147 for supplies. From the Lexington group of mines 2815 tons of ore were extracted; $21,857 was paid for labor and $4340 for supplies. The Alice G. & S. M. Co. is the only mine operated at a loss. It mined 5004 tons of ore, from which it received $71,706. Its expenses were $75,229.67. The property is owned by the Walker Bros. of Salt Lake and its product is largely silver. The Colusa-Parrott Co. extracted 236,635 tons of ore at an expenditure of $854,233. Other items of expense were: Transportation, $65,033; reduction, $792,609; supplies, $305,005

The discovery of immense copper veins in the hills just east of Butte is reported. Extensions of veins from the Anaconda and Boston & Montana properties are believed to have been found. Hundreds of claims have been made. In one, which is called the Hornet, a rich vein was found within 8 to 20 feet of the surface. F. Farrell of Ansonia, Conn., is said to have bought several hundred acres, paying for them $1,500,000. The Anaconda, Boston & Montana, Butte & Boston, Heinze and Clark companies are scrambling for ground.

Operations on the Smokehouse mine, in Butte, have ceased, because the owners of the property have refused to grant the exploration company an extension of the option. Nearly $150,000 has been spent, but without success, in finding the large lead north of the shaft, exposed while workmen were excavating for a building.

The Nipper M. Co. has mortgaged for $2,500,000 all its property, including an interest in the Nipper, L. E. R. and Nightingale copper mines.

The shaft on the Gem mine is down over 700 feet. The property is being worked by J. A. Murray and H. L. Frank, who have spent about $75,000 in its development.

The District Court's decision in the suit brought by M. Finlen against F. A. Heinze and the Johnstown M. Co. to recover possession of the Minnie Healey mine, valued at $10,000,000, was in favor of Heinze and the company. The decision makes it necessary for the defendants to pay Finlen $54,000 to recompense him for the money expended in the development of the property prior to its sale to Heinze. The decree gives Heinze undisputed ownership of five-eighths of the stock and the Johnstown Co. one-eighth. It is said operations will be resumed at once.

The Alice mine at Butte has a large body of ore, but it has so far proved a failure, because the mixture of minerals

is such that metallurgists have not successfully treated them. T. W. Buzzo is general manager of the company. A large quantity of the ore of the Alice carried six distinct minerals—gold, silver, copper, lead, zinc and iron—and their separate values per ton of ore is about $7 in gold, an average of twelve ounces in silver, $15 in copper, from $16 to $18 in zinc and from $3 to $4 in lead. The Alice company wants a process for saving at least 75% of all these minerals.

NEVADA.

DOUGLAS COUNTY.

The placer mines in Pine Nut district are being worked by a few men, and it is thought that there will be enough water to continue operations until August, when the clean-up will be made.

ELKO COUNTY.

The King Solomon M. & M. Co. has been incorporated in Salt Lake City, Utah, capital $2,000,000, E. M. Conroy of Ogden president, J. D. Murphy of Ogden secretary, A. J. McCune engineer, W. B. Alexander of Lafayette, Ind., assistant engineer, to mine in Elko county, along the Bruneau river, on which about 3000 feet of development work has already been done and buildings and machinery erected. The are two parallel ledges, 100 feet apart, workable by a tunnel, which will open them about 1000 feet down. The water power is more than required, while the ores are handled wholly by gravity. Construction of a mill is to begin at once.

ESMERALDA COUNTY.

The Vulcan Con. C. Co., capital $50,000,000, has been incorporated in West Virginia to purchase and operate the Vulcan copper mines. H. Siegel of New York is president, J. A. Bamberger of Salt Lake City is vice-president, and C. T. Champion secretary of the new company.

LANDER COUNTY.

T. H. Dalton and F. W. Dixon of Austin have discovered a deposit of wolframite (tungsten ore) that appears to be of considerable extent.

J. A. Miller has sold the Morse group of mines at Gold Park, 35 miles west of Austin, to J. W. Cliff, who represents Des Moines, Iowa, people, for $60,000.

NYE COUNTY.

By an official survey Tonopah district is found to be in Nye county, 2 miles from the line of Esmeralda county.

There are about 650 people in Tonopah camp. It is said to be no place for a man to go for day's work at the present time, as all the ground is taken up and everyone is working his own lease. Butler, the discoverer of the camp, at present is paying the board of about sixty men who are broke. The mines have been bonded by Grass Valley, Cal., capitalists for $336,000 until January 1, 1902.

WASHOE COUNTY.

C. Norcross and Washington people have bonded two claims in the Pyramid district known as the Norton mine. The claims contain a ledge 12 feet wide, which prospects well in free gold. Four men have been put to work.

An important strike is said to have been made on an extension of the Wedekind or Reno Star property. Ore almost identical has been found. Considerable development has been made. D. C. Wheeler of Reno is interested in this property. The find is about 2 miles north of the Reno Star and is believed to be a continuation of the main lode as struck in the Wedekind and Bell mines. Work has been commenced on the claim immediately adjoining the Reno Star, and a shaft will be sunk to a depth of 400 feet to reach the lode.

WHITE PINE COUNTY.

It is reported that a proposition has been made by a syndicate of copper men for the lease of the mines of the Chinaman Co. at a rental of $20,000 a month for ten years, the lease to be conditioned on the showing of the 300-foot level. This proposition has not been accepted.

Owing to the fact that the Rocco-Homestake-Nevada Co., near Hamilton, is not willing to sign a five years' contract to sell its ores to the smelting trust, the management of the company has decided to hold them at Eureka until satisfactory arrangements for their sale under more favorable conditions are made. They will, however, continue production.

In the New Century mine at Cherry Creek a discovery of high-grade silver and gold ore has been made. It is now being extracted and shipped. This mine is the north extension of the Exchequer mine.

NEW MEXICO.

BERNALILLO COUNTY.

Nancimiento, located in the northwestern portion of the county, has been in operation about a year. The work done has developed several bodies of medium-grade copper ore. The Jura Trias M. Co. will erect a matte smelting plant of 100 tons capacity per day. The company owns several claims in the camp developed to pay. The machinery for the smelter is on the ground, buildings are being constructed and it is expected that the smelter will be blown in in about sixty days.

J. A. Coram of Boston, president; E. L. White of Lowell, Mass., secretary; D. McVickey of Salt Lake City, Utah, general superintendent of the Albemarle & Navajo G. M. Co., operating mines, mills and smelters in the Cochiti district, have been looking over the properties of the company. Mr. Coram says the Albemarle mine is becoming richer with the deeper working and a higher grade of gold ore is now being mined, also additional purchases of improved machinery will be made.

GRANT COUNTY.

From Hanover, known chiefly by association with the Santa Rita copper camps, is a report that a find of placer gold has been made there on Whitewater creek, which runs through the properties of the Boston Picket, the Lost Mine, the Tin Cup, the Rattler and the Eureka. The natives are earning from $5 to $10 per day washing gold in the most crude and primitive manner, with tin plates or any old thing. The location of the strike is southwest of Hanover, between Hall's station and the town of Central. Lode mining on the properties named, which are owned by a resident of Central, is carried on by lessees and shipments made to the smelter are said to have brought returns of from five to seventy ounces in gold to the ton.

LINCOLN COUNTY.

The new town, Estey City, in the Oscura copper district, 15 miles west of Malagra station, is growing rapidly. A company store, warehouse and hotel is now up and in operation. There are also about thirty tents. A part of the machinery for the Estey plant is now on the ground, and Dr. Dryson, son-in-law of D. M. Estey, estimates that it will take sixty to ninety days to set up the machinery and get the leaching plant ready for operation.

OREGON.

BAKER COUNTY.

T. F. Rea, of Baker City, has bonded the Mormon group of mines at $20,000 from Sage, Grace, Young, Shurtliff & Smith, the owners. Mr. Rea proposes to drive the deep tunnel under the pay chute.

At the Crown Point, near Sumpter, the tunnel is now in 650 feet and it is expected to tap the ledge soon.

Manager Bishop of the Climax mine, near Sumpter, reports that he has cleared the tunnel of the debris washed in from the breaking of the ditch. The blacksmith shop and toolhouse have been rebuilt, but twenty tons of high-grade ore, valued at $6000, washed away by the flood, has not been recovered.

Claims of strikes in several mines and prospects in the Susanville district are made. The Badger mine is sending two carloads of ore daily to Whitney for shipment to San Francisco. The new postoffice will be opened at Whitney before July 1.

Manager A. Buckbee of the Virtue mine says the mine is being worked with twenty men, who take out enough ore to keep ten stamps going. There is a good prospect, owing to the steady increase in values, of the working force being increased.

Some promising discoveries have been made in the Bridgeport district.

The Oreol mine, in Robinsonville district, owned by L. D. Shoat, J. L. Baer and H. Fuchs of Baker City, has been bonded to J. F. Cupid.

GRANT COUNTY.

J. F. Hardee of the Climax mine, at Granite, says a 19-foot ledge of gold-bearing quartz has been cut at the mine. At first it was thought the foot wall had been struck, but the find proved to be a large ore body in a slate formation.

JOSEPHINE COUNTY.

N. B. Meade is engaged in development work in his mine on Jones creek. A 100-foot tunnel cuts the ledge, showing 5 feet of good ore.

Henderson & Scribner's mine, in the Wolf Creek district, has produced $10,000 by primitive methods in a few months. The gold is found in a vein of porphyry and decomposed quartz.

The Granite Hill Con. mines, near Grant's pass, have been bonded to J. L. Wiggins of Minneapolis at $75,000. The first payment is due Sept. 1, the remaining payments at intervals of three months. The property consists of placer and quartz workings. The placer grounds are a red gravel, easily worked and rich in gold. The quartz claims are equipped with a 5-stamp mill and other improvements. Development work will be done during the summer.

UNION COUNTY.

A gold discovery has been made 12 miles southeast of La Grande. The surface ore assays $50 to the ton. It is a tunnel proposition and easily workable.

UTAH.

BEAVER COUNTY.

B. F. Woodward, superintendent of the South Granite group, east of the O. K., reports that on the South Granite he has run an incline down about 20 feet, and opened up 10 feet of ore going from 40% to 57% lead, 5.5 ounces silver and $3 gold per ton.

GARFIELD COUNTY.

E. W. Stanton, manager of the Eastern company operating placer ground on the Colorado river, says that since the completion of the dredger it has worked smoothly and saves gold that amply justifies the investment. He said that he anticipated that the company would order at least one new dredger. The gold found in the river sands is very fine and difficult to save, and occasionally pay streaks are encountered in which the gold is as large as fine shot.

JUAB COUNTY.

Secretary Wilkinson of the Mammoth Co. has reported that three cars, sixty tons, of ore from the 1700-foot level had been sold for a little more than $5000, the controls showing 81 ounces silver and $20.61 gold per ton.

KANE COUNTY.

At the annual meeting of the Paria Copper Co., H. W. Hartley was elected president and J. L. Perkes of Salt Lake City secretary and treasurer.

PIUTE COUNTY

The Iron Mountain C. Co. has incorporated, capital $50,000. D. J. Frew is president, E. Thompson vice-president, W. Houchen, Cedar City, Iron county, secretary and treasurer. The company owns the Oregon, Indiana, Illinois, Ohio, Texas and Iowa and a lease on five other mining claims.

SALT LAKE COUNTY.

The U. S. M. Co. have let the contract for the main smelter building which is to be of steel, and is to be completed in four months.

H. M. Crowther, Supt. of the Tiewaukee-Winnemuck group at Bingham, reports that the Winnemuck mill was started up on the 13th with ore of good quality from the Tiewaukee.

Grading of the site of the United States M. Co.'s $500,000 smelter has been begun by Gardner Bros. of West Jordan, the contractors. Dedericks & Burke have contracted the construction of the ore bins and trestles. The bins are over 700 feet in length, and with the elevated portion of the railway to correspond with them will require 850,000 feet of lumber. The Rio Grande Western Co. has begun work on the spur to the site. F. W. Nelson, who has just completed the Excelsior plant in Nevada, and who directed the work of the Santa Fe Co.'s new smelter in Mexico, is Supt. of construction.

SUMMIT COUNTY.

The Golden Electrical Power & Transmission Co. has been incorporated, capital $50,000, to provide an electric power plant and distribution for Park valley mines. It is proposed to use the water of George creek. H. Joseph and others of Salt Lake City are the people interested.

Local shareholders in the Quincy M. Co. of Park City expect the mine to pay a dividend early in July. Among those interested are Manager D. C. McLaughlin, E. F. Holmes, H. Newell, D. Keith, W. V. Rice, J. T. Clasby, J. Farrell, D. D. Irwin and W. W. Armstrong.

The Daily M. Co. has elected C. S. Rood president and general superintendent to fill the vacancies created by the death of R. C. Chambers. W. R. Wightman was elected secretary.

The Golconda of Park valley has opened up 2 feet of ore assaying an average of $13 gold per ton. The strike, according to the management, was made on the 100-foot level.

The Silver Key group at Park City has been bought by Mrs. S. A. Daft, $8000 being paid on an option at about $40,000. She will begin development at once. The Silver Key is located upon the Crescent vein.

TOOELE COUNTY.

The original workings in the Mercur mine were in the upper ore body, which pitches to the southeast, and from which the bulk of the oxidized ores came that kept the old Mercur mill running for a number of years. The newer workings, made since the consolidation of the Mercur with the Golden Gate, have been largely confined to the lower ore body, which has a similar pitch to that of the upper vein. The lower vein carries arsenical sulphide ores generally, excepting at the outcrop in Sacramento gulch, where they are oxidized. The Mercur mill was not provided with roasters for treating the base ores, hence the operations which supplied it with ore were confined to the oxidized strata of the mine. The Golden Gate mill is specially equipped to treat the refractory ores, and when the consolidation took place last year that mill began to draw at once from the large bodies of arsenical sulphides of the Mercur mine, as well as the oxides, and the Mercur mill closed down.

The new work on the Mercur, which opens up such large reserves of base ore, is through a main tunnel that strikes southward, then westward, several thousand feet, cutting under the ore body in most places. Above this tunnel level are three other levels approximately 25 feet apart, each with a large amount of work in the shape of systematic blocking out on a horizontal plane. All these levels are connected with the main tunnel level by chutes and raises. All this work from level to level, including upraises, is in ore, with the exception of here and there a roll of lime. Ore shipments to the amount of about 800 tons per day are being taken from this newly-opened ore body. This is dumped into ore bins, which load into cars that are operated between the mine and mill by electric locomotives. The mill, which is now operating on about 1000 tons of ore per twenty-four hours, is supplied by the additional 200 tons from the Golden Gate workings, which are reached by a shaft that sinks near the mill. The great mill is automatic throughout, conveyors and elevators performing a large part in passing the ore from the crushing department through the roasters to the cyanide leaching tanks. The power consists of a heavy battery of steam boilers and two engines, which operate two electric generators. From the generators electric power is transmitted to a system of motors in the mill, by which the latter is operated.

The old Mercur mill at Manning is being put in condition to operate again, the idea being to leach the tailings which resulted from former operations.

The Sacramento mine and mill are operating, the mill treating about 150 tons of ore per day. The ore is about one-half oxidized, the other half being a black sulphide that carries no arsenic but considerable talc. For this base ore a roaster has been added to the mill. H. L. Benner is the manager.

The West Dip properties, comprising the Daisy, La Cigale and others, each equipped with a good mill, have been idle for some time. They experienced difficulty in making a satisfactory extraction of values. The matter of starting them up again is being considered.

The Northern Light mine is operating, but with a small force. The mill is idle at present.

The Chloride Point is being worked by a few leasers at present, the mill being lide. WASCOTT.

Mercur, May 25.

The Honerine of Stockton has 500 tons of ore in its bins and has commenced shipping. Manager C. H. Scheu says the ores on which shipments are resumed contain an average of 50% lead, twenty-five ounces silver and $2 gold per ton.

SOUTH DAKOTA.

PENNINGTON COUNTY.

The Spearfish G. M. Co.'s mill, near Deadwood, is crushing seventy-five tons daily, and is adding eight more cyanide tanks, to increase the treatment to 200 tons daily.

WASHINGTON.

FERRY COUNTY.

Free gold has been found in a large body of decomposed quartz on the south slope Belcher mountain, near the wagon road from Republic to Marcus. The gold can be panned freely. A shaft has been sunk 16 feet on the ledge and a crosscut run 14 feet in quartz so soft that the work is done without blasting. Assays shows values of from $5 to $26 per ton.

There is said to be 3 feet of fine shipping ore in the face of the third level of the California, at Republic. On the second level the drift is all in ore of good grade. President H. B. Ives of New Haven, Conn., who visited the mine recently, is anxious to build a concentrator, and the matter will be laid before the company on his return home. It has been decided to install a compressor plant. It will be of the Leyner six-drill type. Supt. Delbridge says that the machinery will be on the ground by July 1. The shaft will be carried to a depth of 600 feet.

R. J. Davis of Daisy, Supt. of the Nonpareil M. Co., in Meteor camp, says: "The Nonpareil properties consist of seven claims. The property has 700 feet of development work. Drifting has been extended both ways along the vein for 200 feet and exposes an ore chute the entire distance. The vein on the tunnel level is from 4 to 6 feet, between two well defined walls, with a pay streak from 2 to 2½ feet, containing gold, silver and lead. A winze

was sunk on the west level to a depth of 30 feet, when water stopped sinking till a pump is installed. An average of the ore in the winze assayed $74.26."

The Hawkeye Co. will install a compressor plant of three drill capacity and a steam hoist at an early day. Supt. J. L. Harper thinks the new plant will be running by the first of August. The shaft is to be continued to the 450-foot level.

WYOMING.

CARBON COUNTY.

C. Custer of Laramie has sold his one-quarter interest in the Rambler mine to A. E. Humphrey of Denver for $100,000. Custer was one of the first owners of the mine, purchasing his interest for $800, which he borrowed.

J. G. Rankin of Rawlins has Bessemer iron ore in the Ferris Mountain district that will run 60% iron. The lead is claimed to be over 80 feet in width, and traceable for 3 miles.

FREMONT COUNTY.

The Carissa mine continues development work. Manager Tibbals says they are driving levels and opening stopes, so that any quantity of ore required for the mill can be furnished. When the company holds its annual meeting plans will be considered for further opening the mine, and for the construction of large reduction works. The placers of Atlantic, operated by the Dexter G. M. Co., are being worked under the management of C. G. Memmenger, M. E.

The new strike of Hoisington, Carr & Lyons is being opened up. They will sink a perpendicular shaft to water level and then crosscut to the vein.

FOREIGN.

BRITISH COLUMBIA.

C. H. Stillwell of Montreal has bonded the Walrus group of claims, in the Lardeau mining division, from McKay & McKenzie, for $80,000.

A new discovery of free gold has just been made near Nelson. Assays show values of $24 in gold in the ore.

The Noble Five M. & M. Co. have contracted for a 320-foot tunnel to cut the Last Chance vein.

The Hampton group, near Slocan, has resumed operations. N. F. McNut of Silverton, the owner, is operating it.

Nelson, June 12. A. F. R.

The Mount Sicker & B. C. Dev. Co. will, it is said, develop their properties (sixteen claims) on Mount Sicker on a large scale. H. Croft, manager of the Lenora mine, is also manager for this company, which has $100,000 in the treasury.

The Tyhee mine, at Mount Sicker, has had over $100,000 expended in development to date, and good ore bodies have been opened up. The owners, an English company, intend to erect their own smelter.

The Key City claim, owned by Sacramento, Cal., people, at Mount Sicker, adjoins the Lenora on the west. Development work is being done.

The Hayes mine, on Alberni canal, is said to have 75,000 tons of copper ore blocked out. A tramway is to be built, so as to ship the ore economically.

The Monitor mine, at Alberni, is being developed and has made several shipments of copper ore to the smelters.

The Iron mine (copper), at Alberni, has made some trial shipments.

In the Magnetic iron claims, at Alberni, developments have been made with, it is said, very satisfactory results. This property and a number of other iron claims have been bonded by Americans, represented by a Mr. Swaney, who has also taken over the blast furnace at Port Townsend, Wash., which is to be started soon with iron ore from Texada island.

Victoria, June 4. H. C.

S. W. Hall, manager of the Homestake mine at Rossland, says that the company will commence shipping ore on a commercial basis without delay, the development work and blocking out of ore bodies having been advanced to a point at which ore production in quantity can be maintained.

On Hardscrabble creek, Barkersville, W. C. Fry last week struck good pay—five or six ounces to the set—and is said to have considerable good ground ahead. W. A. Johnson of Quesnel owns the mine with Mr. Fry.

Cockle, Johnson & Isaacs, on Stewart's creek, near Barkersville, are working in good ground, with four to six ounces per set, and on the same creek, a mile above, Petrie, Smith & Co. own and are working drifting ground that is paying four to six ounces per set of timbers.

CUBA.

New York capitalists, including W. A. Chanler and C. Rand, have taken an option on many of the copper properties held by Spanish companies in the Cobre district, Santiago Province, and have also a lease of the mines formerly worked by the Consolidated Royal C. M. Co. of London. The nature of the copper ore deposits in this locality is narrow and short veins. Hence the workings of the mines must be made deeper, requiring pumping. Experiments are now being made in the extraction of copper from the water with which the mines are flooded. At the San Jose shaft a pumping plant of 500 gallons capacity per minute is in use. On the Consolidated properties a natural flow of water is passed over scrap iron in the tunnel and the cement copper shipped to England yields $600 per month, the expense of collecting the cement not exceeding $10.

THE KLONDIKE.

A nugget valued at $1020, weighing 63½ ounces, has been found on F. Phiscator's claim, No. 2 El Dorado. The ground was being worked on a lay by T. G. Edgar. This is the second largest nugget found in the Klondike. The largest found on Cheechaco was worth about $1300. The piece is flat and has a little quartz in the sides. It was thrown in the sluice and not discovered until the riffles were cleaned.

MEXICO.

F. Sterling has sold to a Dunkirk, Ind., company his gold mining claims 80 miles south of Nogales. There are fifteen pertenences in the group, and the company have taken an option on 1000 pertenences adjacent. F. Sterling, of Nogales, Ariz., is manager, J. Bates, of Dunkirk, is president, and M. H. Sloan, of Dunkirk, secretary. R. Burnham has been appointed mine superintendent.

J. Sheridan, of Duluth, Minn., has recently bought the interest of A. C. Wright in the Tejada mine, in the Sahuaripa district, and is now associated with S. A. Williams of Hermosillo, Sonora, in its ownership. It is their intention to begin work upon the mine and push its development.

Books Received.

"Annual Report of the Smithsonian Institution," for 1899, published by the Government printing office at Washington, D. C., 672 pages, 8vo. In addition to the formal official administrative subreports and financial statements, the volume contains over 500 pages of general appendix treating of thirty subjects, selections of papers by the most advanced thinkers in many lines of physical research. These papers are interesting and instructive and do not show the weakness of many government reports in a vast waste of words, among which one must wander in search of surprises in thought. All that appears in this volume is the thought of thinkers, and well told, much of it being novel. The volume well fulfills the object of the foundation of the Institution, "For the increase and diffusion of knowledge among men."

"Bulletin No. 10-A—"Preliminary Report on Part of the Iron Ores of Georgia," by S. W. McCallie, Asst. Geologist of State Geological Survey of Georgia, 188 pages, illustrated and containing explanatory diagrams and maps. The report deals with the iron ore deposits of the counties of Polk, Bartow and Floyd, and shows care and thoroughness in the gathering of facts and clearness and intelligibility in their expressions. Among technical official reports on mines and minerals, it is in the same class with the Reports of the California State Mineralogist, and in some details rather an improvement. It can be obtained from W. S. Yeates, State Geologist, Atlanta, Georgia.

Recently Declared Mining Dividends.

	Payable.
New York & Honduras Rosario M. Co., Honduras, monthly 1%	June 22
Oil City Petroleum Co., California, ½ cent per share, $2500	July 5
Calumet & Hecla, Michigan, $15 per share, $1,500,000	July 31
South Winnie M. Co., Colorado, 3 cents per share, $7500	June 15
Homestake G. M. Co., South Dakota, monthly and extra 25 cents per share, $105,000	June 25
Gwin Mine Dev. Co., No. 22, 10 cents per share, $10,000	June 18
Rocco-Homestake Nevada M. Co., monthly 1½ cents per share, $4500	July 10

Commercial Paragraphs.

CHAS. M. HAMPSON, mechanical engineer and concentration expert, has just completed the installation of Bartlett concentrators in the new mills of the Cold Spring Mining & Tunnel Co. in Boulder county, Colo., and supervised the remodeling of the concentration department generally.

Personal.

VICTOR M. CLEMENT of Salt Lake City, Utah, is in New York.

JOHN B. FARISH of Denver, Colo., is in California, examining mining properties.

F. E. WARE, manager of the Mount Shasta mine, Shasta, Cal., is in San Francisco.

I. I. MINEAR of the Yankee mine, Custer, Idaho, is in Silver City, of the same State.

T. H. THEWEY of Canada has accepted appointment as Supt. Idaho M. & D. Co., Boise, Idaho.

W. G. PALMER of London is at Bingham, Utah, examining mines for the London Exploration Co.

S. F. HUNT, Supt. Pittsburg G. M. Co., operating in Bingham county, Idaho, is in Salt Lake City, Utah.

B. WARDEN, underground Supt. of the Center Star mine at Rossland, B. C., is in Vancouver on a vacation.

ROBERT BURNHAM has been appointed Supt. of the Sterling claims, Sonora, Mexico, 70 miles south of Nogales.

E. H. BENJAMIN, M. E., of San Francisco, is at Hermosillo, Sonora, Mexico, examining a mining property.

PROF. W. H. KNIGHT of Los Angeles, Cal., has been elected president Southern California Academy of Sciences.

WILLIAM PEARCE of Virginia City, Nev., is in French Gulch, Shasta county, Cal., superintending a gold mine.

J. C. HADLEY of Silver City, Idaho, is at Unionville, Nev., as manager for the Nevada M. & S. Co. of St. Louis, Mo.

WALLACE MACGREGOR of Berkeley, Cal., has gone to Punta Arenas, Costa Rica, in charge of a mining proposition.

L. M. FRENCH, manager of the Blue Jacket mine in the Seven Devils district, Idaho, was in Salt Lake City, Utah, last week.

G. J. MCCARTY, manager Creston-Colorada Co., Minas Prietas, Sonora, Mexico, has returned to the mine from a visit to New York.

GEORGE E. ROBERTS, Director of the U. S. Mint at Washington, D. C., has been sojourning in Denver and Cripple Creek, Colo.

EUGENE HAANEL, professor of physics in Syracuse, N. Y., University, has been appointed Superintendent of Mines of the Dominion of Canada.

GRANT ROBINSON has resigned as superintendent of the mill at the Kendall mine in North Moccasin, Mont., and has gone to Nome, Alaska.

WM. MURRAY of Sierra City, Cal., has accepted an important position with a mining company operating in Corea and has gone to that country.

A. BORDEAUX, general manager of the Ralston Divide G. M. Co. of Placer county, Cal., has gone to Paris, the headquarters of the company.

F. SWINDLER, late superintendent of the De Lamar mine at De Lamar, Nev., has gone to South Africa to accept a position in one of the Rand mines.

DR. JOHN B. PORTER, professor of mining and metallurgy in the McGill University, Toronto, Canada, has been spending a few days at Grass Valley, Cal., examining the mines of that district.

PROF. S. B. CHRISTY of the University of California has gone to Europe with Architect Howard of New York to examine mining schools there for suggestions for plans for the new mines building of the University.

HERR KREUZER, Royal Inspector of Mines of the German Empire; Herr Horter, special agent of the German Government to inquire into the mining industry of the United States, and Herr Vogelsang, mining engineer of Berlin, have been visiting Cripple Creek and Leadville, Colo. They are a commission appointed by the Emperor to make a thorough investigation of mining conditions and methods in the United States, and, after examining Colorado mines, will go to Utah, California, Oregon and Montana.

Catalogues Received.

The Sullivan Machinery Co. have issued Catalogue No. 46—"Bullock Diamond Prospecting Core Drill." The publication is more than a catalogue. It is a hand-book of practice replete with instructions for use, illustrated by drawings and containing records of costs of actual operation from which mine managers can estimate on their own special problems. It is a desirable book of reference on the subject of diamond drill operation. The catalogue can be had on application to the Sullivan Machinery Co., 135 Adams St., Chicago, Ill.

Latest Market Reports.

SAN FRANCISCO, June 20, 1901.

SILVER—Per oz., Troy: London, 27⅜d (standard ounce, 925 fine); New York, bar silver, 59½c (1000 fine); San Francisco, 59½c; Mexican dollars, 50c San Francisco, 48¾c New York.

COPPER.—New York: Lake, 1 to 3 casks, $17.25; carload lots, $17.00; Electrolytic, 1 to 3 casks, $16.75; carload lots, $16.62½; Casting, 1 to 3 casks, $16.60; carload lots, 16.50. San Francisco: 18. Mill copper plates, 20c; bars, 22@23c. London: £69 5s per ton.

LEAD.—New York, $4.37½; Salt Lake City, $4.00; St. Louis, $4.32½; San Francisco $4.90, carload lots; 5½c 1000 to 4000 lbs.; pipe 6, sheet 6½, bar 5½c; pig, $5.25. London, £12 7s 6d per ton=2.69 cents per lb.

SPELTER. — New York, $4.20; St. Louis, $3.75; London, £16 2s 6d per ton =3.58½ cts. per lb; San Francisco, ton lots, 5½c; 100-lb lots, 6c.

ANTIMONY.—New York, Cookson's, 10c; Hallett's, 9c; San Francisco, 1000-lb. lots, 10c; 300 to 500 lbs., 11c; 100-lb. lots, 13@15c.

IRON.—Pittsburg, Bessemer pig, $17.25; gray forge, $16.50; San Francisco, bar, per lb., 2.65c in small quantities.

STEEL.—Bessemer billets, Pittsburg, $24; open hearth billets, $27.00; San Francisco, bar, 7c to 12c per lb.

TIN.—New York, pig, $26.00; San Francisco, ton lots, 30c; 1000 lbs., 30½c; 500 lbs., 30¾c; less, 31c; bar tin, ℔ lb, 35c.

QUICKSILVER. — New York, $51.00 large lots; London, £9 2s 6d; San Francisco, local, $47.00 ℔ flask of 76½ lbs.; Export, $45.00

MAGNESIUM.—New York, $2.90 ℔ lb.; San Francisco, $3.75.

ZINC.—San Francisco, 5½c; slab, 5¾c; bar, 7c; zinc dust, N. Y., 8c.

BABBITT METAL.— San Francisco, No. 1, 10c.

SOLDER. — Half-and-half, 100-lb. lots, 19c; San Francisco, Plumbers', 100-lb. lots, 15¾c.

PHOSPHORUS. — F. o. b. New York 50@60c ℔ lb.

ASSAY LITHARGE.—San Francisco, 10c ℔ lb, small lots.

BISMUTH.—New York, ℔ lb., $2.25 50-lb lots; San Francisco, $2.50 to $2.75 lb lots.

PLATINUM.—San Francisco, crude, $22 ℔ oz.; New York, $22 per Troy oz

FERRO-MANGANESE. — Pittsburg, 80%, domestic, $62.50, large lots.

ALUMINUM.—New York, No. 1, 99% pure ingots, 35c; No. 2, 90%, 30c to 35c.

TUNGSTEN.—New York, ℔ lb., 95c; San Francisco, $1.15.

FERRO-TUNGSTEN. — New York, 37%, 32c; San Francisco, 65c (60%).

NICKEL.—New York, 50@60c ℔ lb.

POWDER.—F. o. b. San Francisco: No. 1. 70% nitro-glycerine, per lb., in carload lots, 15½c; less than one ton, 17½c. No. 1*, 60%, carload lots, 13½c; less than one ton, 15½c. No. 1** 50%, carload lots, 11¾c; less than one ton, 13¾c. No. 2, 40%, carload lots, 10c; less than one ton, 12c. No. 2* 35%, carload lots, 9½c; less than one ton, 11½c. No. 2** 30% carload lots, 9c; less than one ton, 11c. Black blasting powder in carload lots, minimum car 728 kegs, $1.50 per keg; less car lots, $2 per keg.

CAPS.—3x, $5.50 per 1000; 4x, $6.50; 5x, $8; Lion, $9, in lots not less than 1000.

FUSE.—Triple tape, $3.60 per 1000 feet; double tape, $3.00; single tape, $2.65; Hemp, $2.10; Cement No. 2, $3.00; Cement No. 1, $2.65, in lots of 3000 feet and up.

CANDLES.—Granite 6s, 16 oz., 40s., 10¾c ℔ set; 14 oz., 40s., 9¾c.

OILS.—Linseed, pure, boiled, bbl., 75c; cs., 80c; raw, bbl., 73c; cs., 78c. Deodorized Stove Gasoline, bulk, 14½c; do., cs., 20½c; 86° Gasoline, bulk, 20c; do., cs., 26c; 63° Naphtha or Benzine, deodorized, in bulk, per gal., 13½c; do., in cs., 19½c; Lard Oil, Extra Winter Strained, bbl., 75c; cs., 80c; No. 1 bbl., 50c; cs., 55c. Neatsfoot Oil, coopers' bbls., 60c; cs., 65c; No. 1 bbl., 50@52½c; cs., 55@57½c.

CHEMICALS.—Cyanide of potassium, 98%-99%, jobbing, 32½@33½c ℔ lb.; carloads, 30@31c; in 10-lb. tins, 40c; sulphuric acid, in carboys, 66% B, 2c ℔ lb.; soda ash, $1.90 ℔ 100 lbs. 58%; hyposulphite of soda, 2¾@3c ℔ lb.; blue vitriol, 5¾@6½c ℔ lb.; borax, concentrated, 7@8c ℔ lb.; chlorate of potash, 12@13c; roll sulphur, 6c; alum, $1.90@2.00; flour sulphur, French, 2¼@2½c; California refined, 1¾@2c; nitric acid, in carboys, 8c ℔ lb.; caustic soda, in drums, 3@4c ℔ lb.; Cal. s. soda, bbls., $1.00; sks, 95c ℔ 100 lbs.; chloride of lime, spot, $2.50@2.60; nitrate of potash, in kegs, 8c; caustic potash, 10c in 40-lb. tins.

COAL. — San Francisco, coast, yard prices: Wellington, $9; Seattle, $7.00; Coos Bay, $5.50; Southfield, $9.00. Cargo lots, Eastern and foreign: Wallsend, $8.00; Brymbo, $7.50; Pennsylvania, hd., $14.00; Scotch, $8; Cumberland, $12; Cannel, $9.50; Welsh Anthracite, $12.00; Rock Springs, $8.50; Colorado Anthracite, $14.50. Coke, $16 per ton in bulk; $18 in sacks.

New Patents.

DEWEY, STRONG & CO.'S SCIENTIFIC PRESS PATENT AGENCY, 330 Market St., S. F., has official reports of the following U. S. patents issued to Pacific coast inventors:

FOR THE WEEK ENDING JUNE 11, 1901.

676,295.—LOCK—I. P. Abbott, Nevada City, Cal.
676,224.—PLATEN PRESS—A. & C. H. Eberle, Downey, Cal.
676,126.—ADVERTISING DEVICE—J. W. Fawkes, Jr., S. F.
676,036.—ANIMAL TRAP—A. R. Hamilton, Los Angeles, Cal.
676,325.—BOX COVER BRACE—E. Kubias, Los Angeles, Cal.
676,094.—FIREARM—Linville & Endicott, Jackson, Cal.
676,070.—CAN COOLING MACHINE—E. Manula, Astoria, Or
676,073.—FISH CLEANING APPARATUS—Munn & Lotz, S. F.
676,370.—TOY PUMP—J. A. Robertson, San Jose, Cal.
676,243—HITCHING FETTER—Rommel & Owen, Los Angeles, Cal.
676,342—SAW SET—T. Roseboom, S. F.
676,400.—TIRE VALVE—J. A. Spencer, Los Angeles, Cal.
676,0 4.—PUMP—F. B Warring, San Jose, Cal.
676,018.—CORK LOCK—J. L. Wilson, Los Angeles, Cal.
34,649.—DESIGN—L. P. J. Herring, Los Gatos, Cal.

Notices of Recent Patents.

Among the patents recently obtained through Dewey, Strong & Co.'s SCIENTIFIC PRESS U. S. and Foreign Patent Agency, the following are worthy of special mention:

MAGAZINE FIREARMS. — No. 676,094. June 11, 1901. R. W. Linville, Gwin Mine, Calaveras Co., Cal., and E. E. Endicott, Jackson, Amador Co., Cal. This invention consists in the combination with a magazine of a carrier by which the cartridges are transferred from the magazine to the barrel, and a longitudinally slidable breech bolt by which the cartridges are transferred to the barrel of a mechanism, and connections whereby the parts are automatically actuated and the gun loaded and fired continuously until the cartridges are exhausted. There is also mechanism by which the discharge may be interrupted and the gun fired singly and successively by independent movements.

MOVABLE ADVERTISING DEVICES.—No. 676,126. June 11, 1901. J. W. Fawkes Jr., San Francisco, Cal. This invention combines in an advertisng device a cabinet or suitable support, a constant source of power actuating sets of continuously moving endless chains in parallel planes, said chains having certain of their links provided with lugs upon which are pivoted frames between the chains in these various sets. There are means for mounting the chains by which these frames retain a vertical position throughout their travel of translucent vertical columns mounted upon adjustable bearings, and means for rotating the columns intermittently. A spring bears against a pin upon the side of each column, and also against the column, and there are means for illuminating the columns.

FISH CLEANING APPARATUS.—No. 676,073. June 11, 1901. W. Munn and A. Lotz, San Francisco, Cal., assignors to Alaska Packers' Association, same place. This invention relates to an apparatus which is designed to receive fish, pass them beneath a cutter by which the heads are severed, thence transfer the fish to other cutters by which the fish is opened, and to scrapers by which the insides are removed, and thence to cleaning brushes and washing devices, and finally to the discharge, the whole thing being conducted continuously and automatically.

ARE YOU GOING EAST THIS SUMMER?

If you are going to the Pan-American Exposition at Buffalo, or to Cincinnati, Detroit, Chicago, Milwaukee, or any point in the East, write or call upon Mr. D. W. Hitchcock, General Agent Union Pacific R. R. Co., No. 1 Montgomery St., San Francisco, in regard to reduced round trip rates to these points. Three trains via this route leave California daily. The time of the "Overland Limited" to Chicago is less than 3 days and to Buffalo 3¼ days, which is nearly a day quicker than any other line.

WANTED.

WANTED, for a large mine in California, an experienced Mine Surveyor who can make plans in good style. Apply with full particulars of experience, copies of references and salary expected, to "Hercules," care of this office.

WANTED. — PROPERTIES CONTAINING **MAGNETIC PYRITES** or **SULPHURETS** by parties who mean business. Address samples and particulars to Dr. Beecher, Oliver Hotel, Corner Mason and Pine Sts., San Francisco, California.

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in a live Western town. Anyone knowing of such a town in need of a telephone exchange will confer a favor by addressing "Telephone," care Mining and Scientific Press.

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P. W. PYNE, West Alameda, Cal.

SITUATIONS WANTED.

SUPERINTENDENT of gold mine or mill desires position. Thoroughly experienced in mining and milling gold ores. Competent assayer, chemist and surveyor. Technical graduate. Salary moderate till ability is demonstrated. Address B. Sc., care this paper.

POSITION in charge of a gold mine or mill desired by a graduate Mining Engineer, who is thoroughly experienced in mining and milling gold ores as practiced in this country and Mexico. Can assay, survey, manage men, etc. Will accept a percentage of profits in a good company for part salary. Address "Engineer," care Mining and Scientific Press.

WANTED.---Position as Superintendent.

Eighteen years' practical experience in the West. Understand the mining and milling of ores for profit. Best of references. Address "Practical Miner," care Mining and Scientific Press.

PRACTICAL SMELTERMAN,

who had experience with sulphide and carbonate copper and lead ores in California and Mexico, competent to design or take charge of smelter, wants responsible position as chemist, furnace boss or superintendent. Address "Metallurgist," care Mining and Scientific Press.

A YOUNG MAN,

having taken a course in surveying, including practical field and office work, wishes position as chainman or work in any capacity with a surveyor, civil or mining engineer. Address M. S., Box 10, Standish, Cal.

THE CALIFORNIA DEBRIS COMMISSION, having received applications to mine by the hydraulic process from A. Lundberg, in the Joseph Thomas Mine, at Plymouth, Amador Co., to deposit tailings in Indian Creek, and from S. I. Simmons et als., in the Victor Placer Mine, in Negro Canyon, Sierra Co., to deposit tailings in Charcoal or Negro Creek, gives notice that a meeting will be held at Room 59, Flood Building, San Francisco, Cal., on June 24, 1901, at 1:30 P. M

Attention of Mining Men
and others is invited to the
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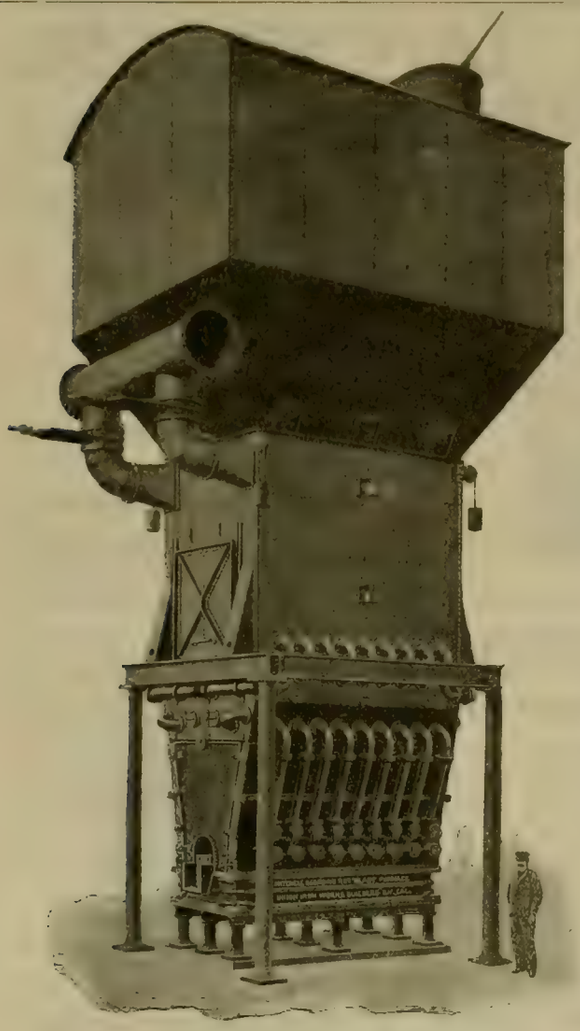

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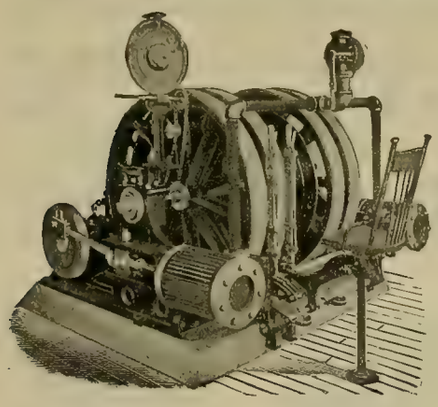

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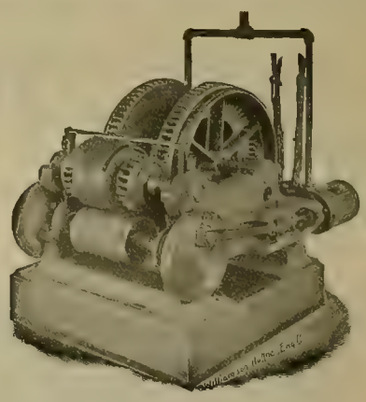

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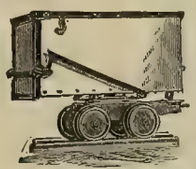

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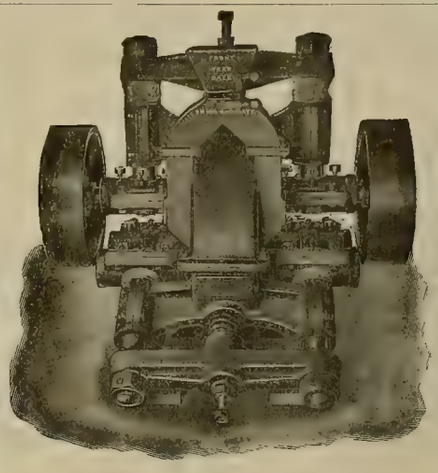

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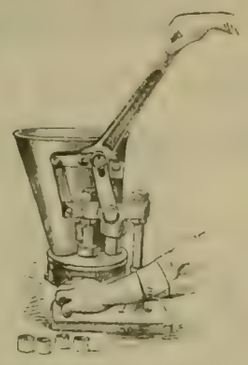

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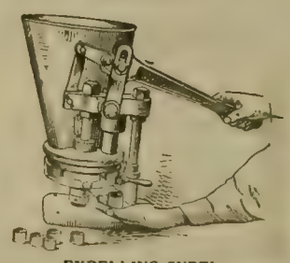

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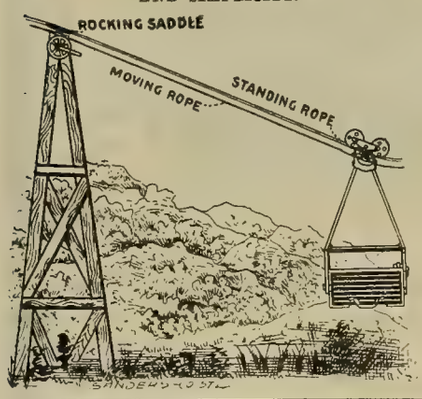

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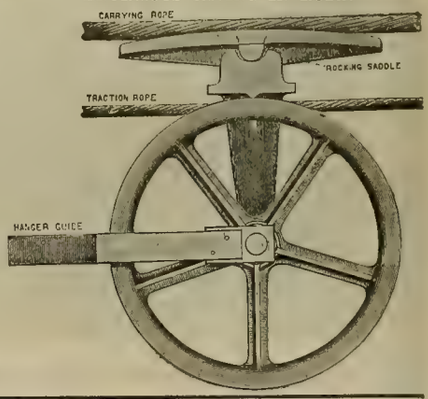

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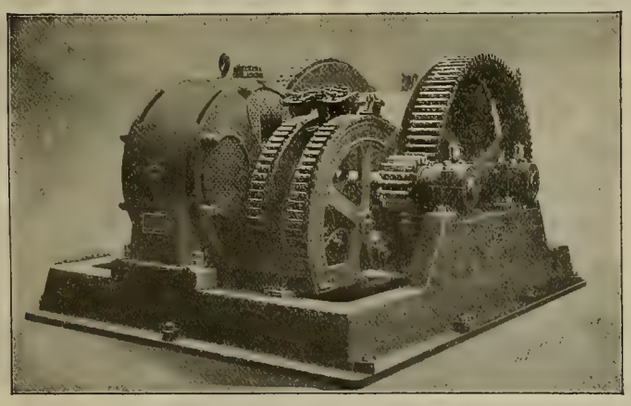

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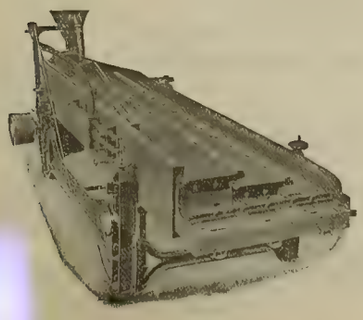

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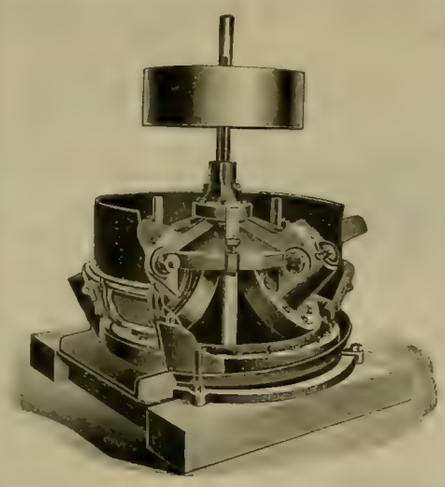

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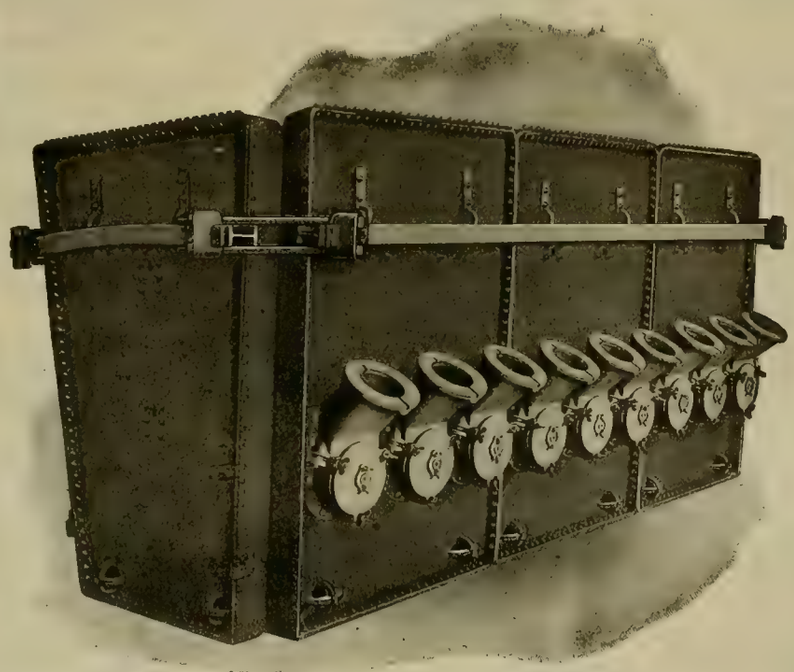

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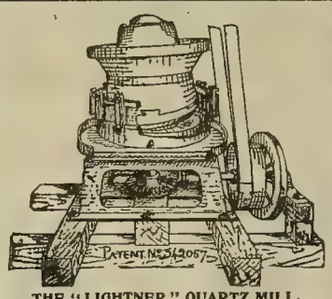

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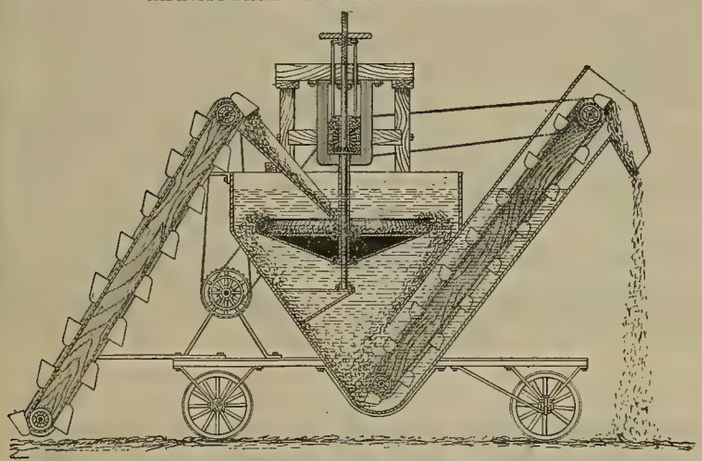

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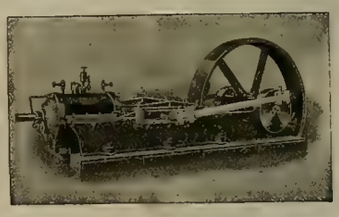

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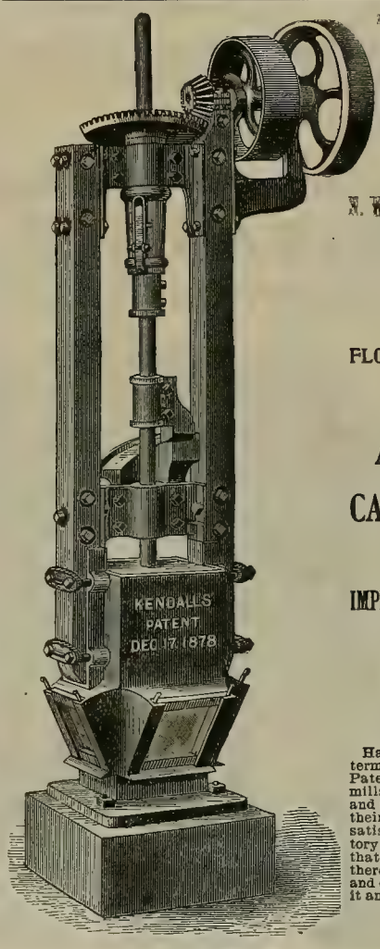

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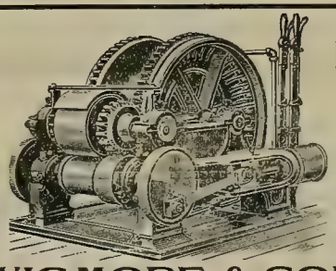

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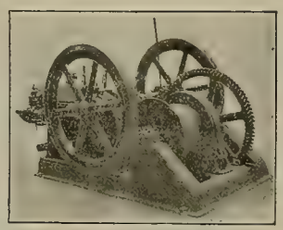

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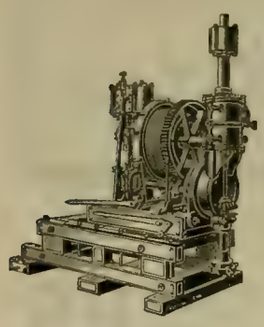

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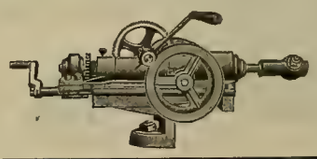

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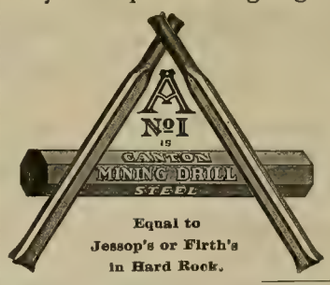

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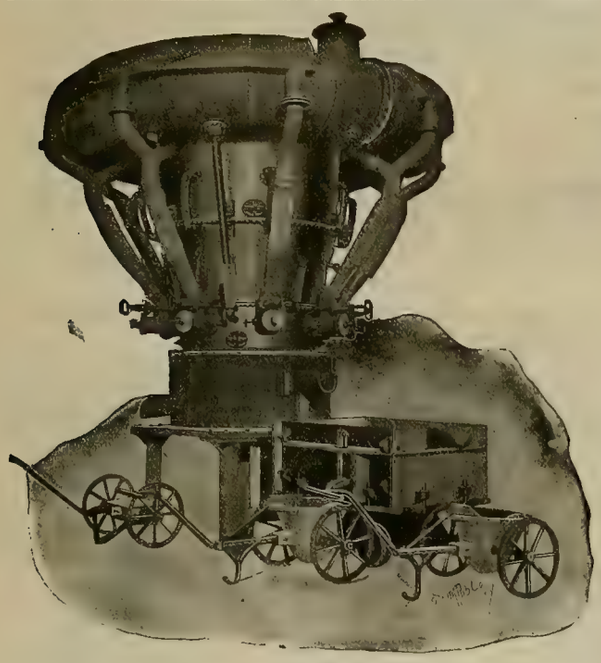

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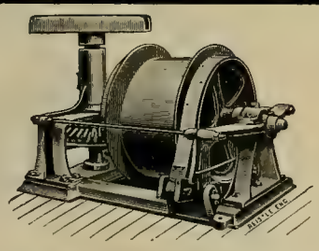

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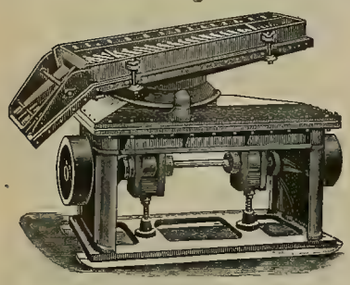

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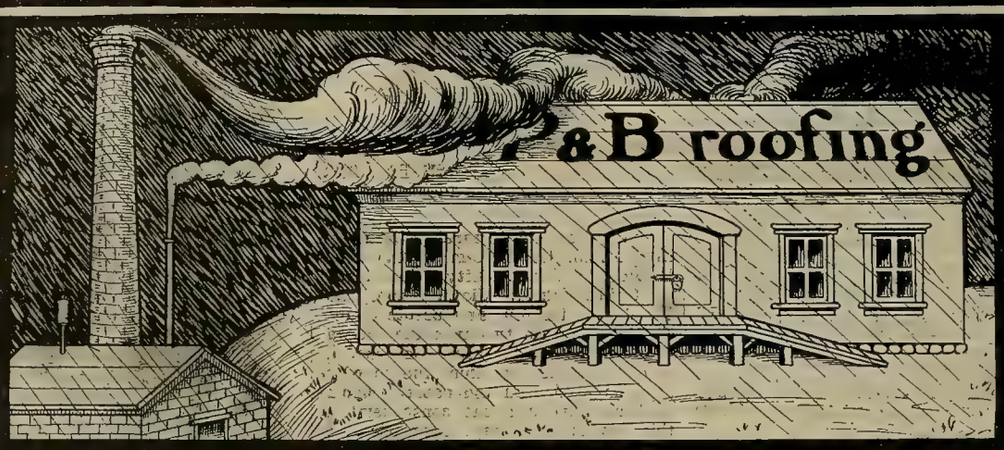

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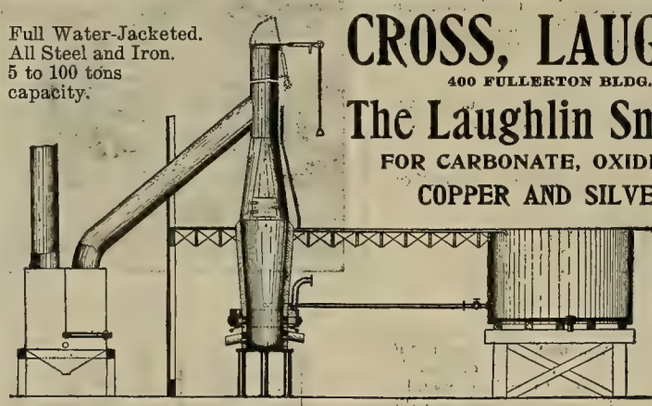

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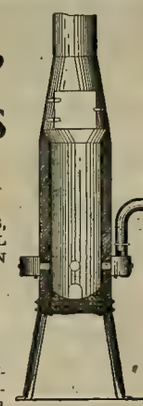

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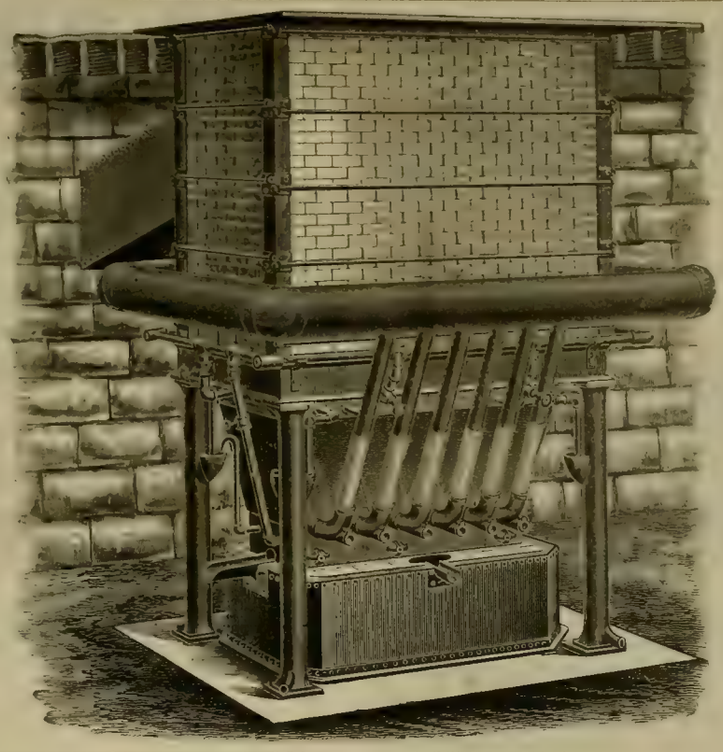

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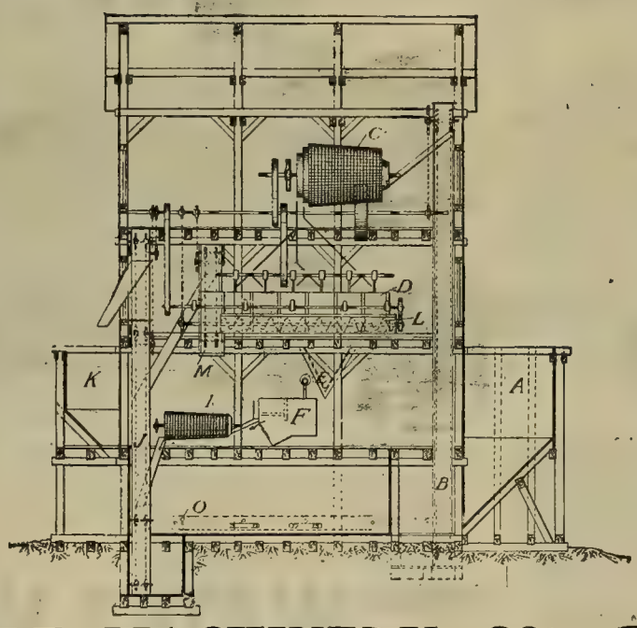

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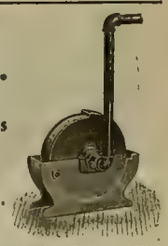

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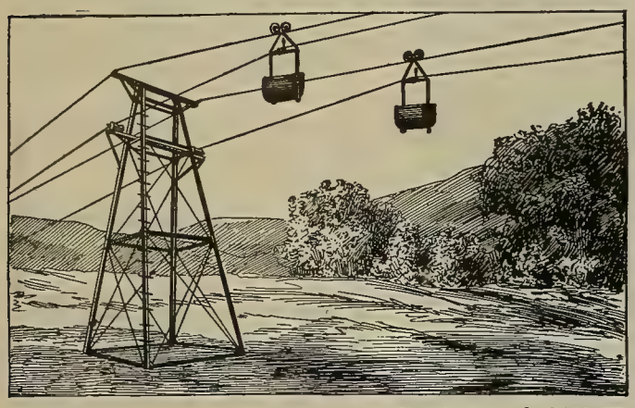

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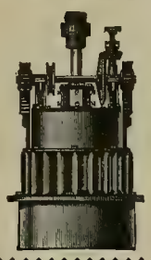

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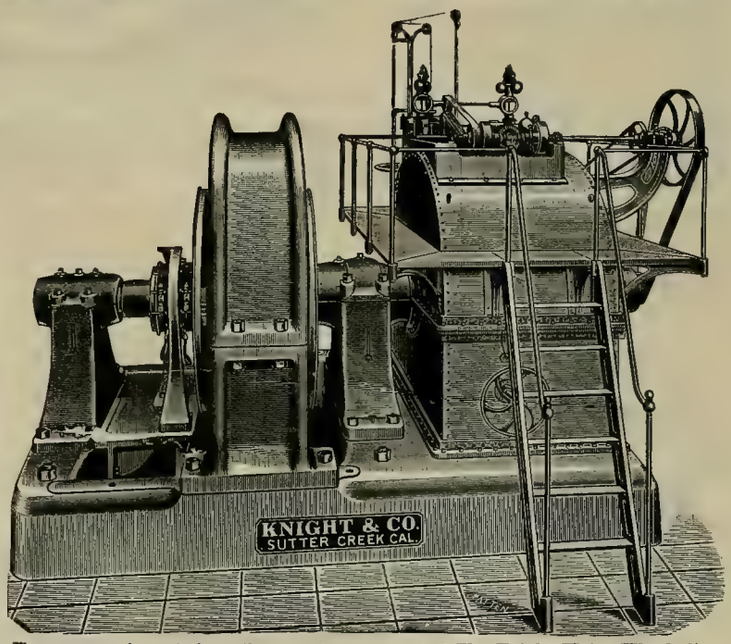

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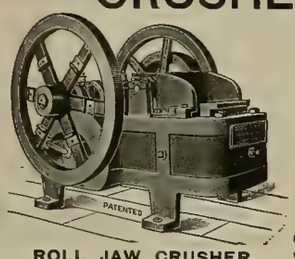

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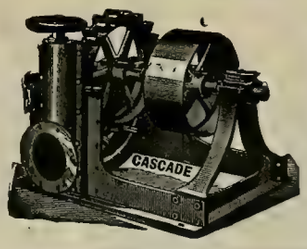

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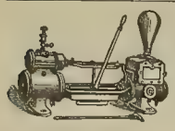

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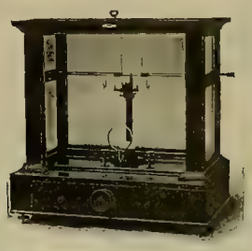

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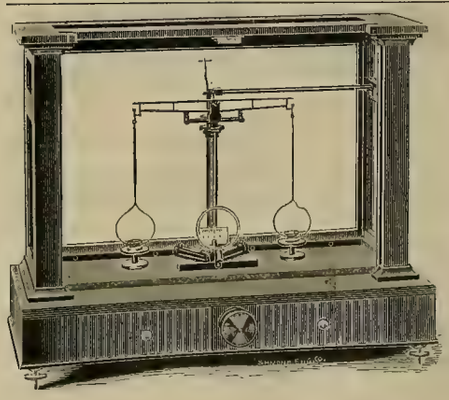

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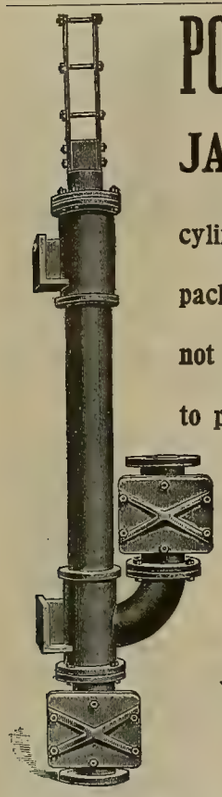

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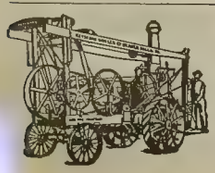

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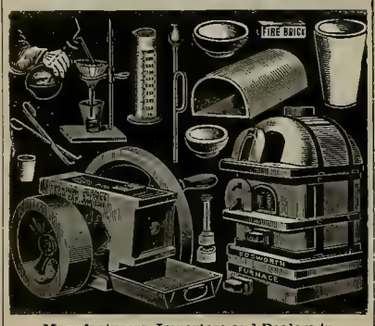

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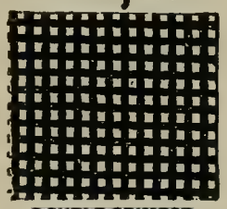

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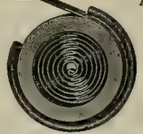

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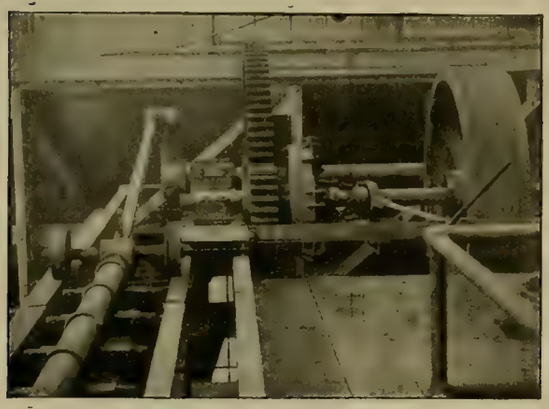

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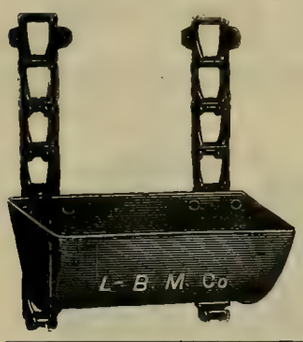

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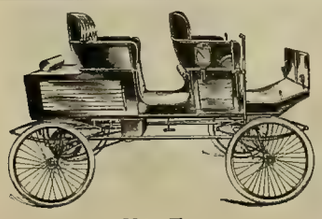

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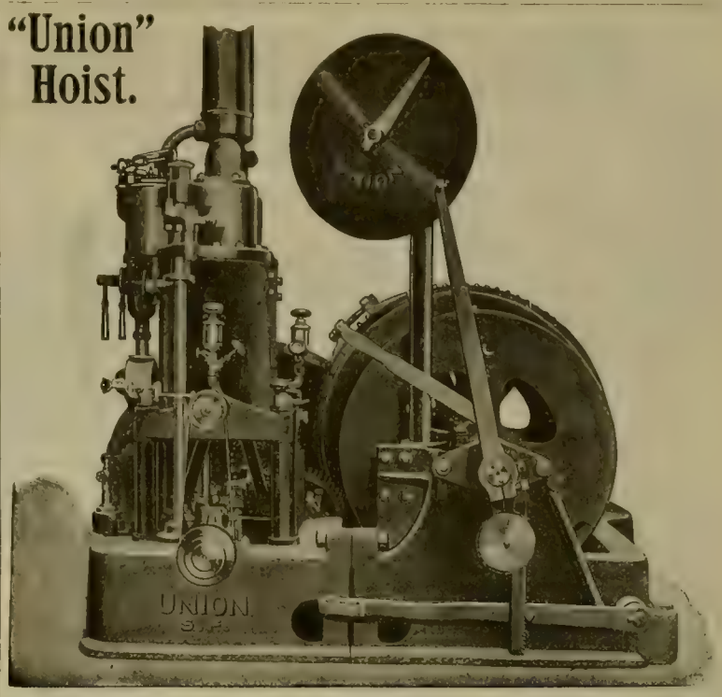

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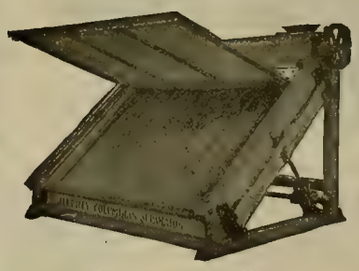

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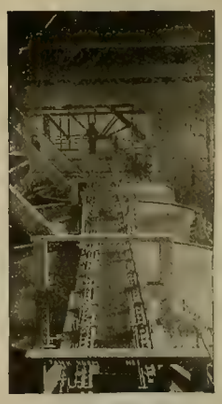

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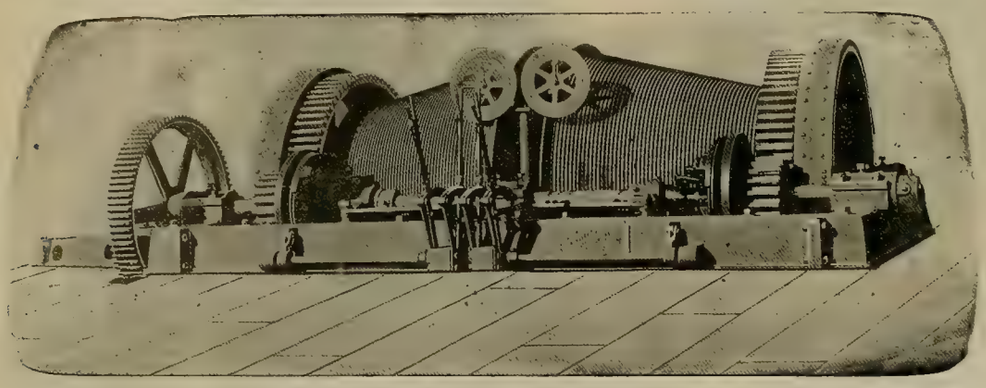

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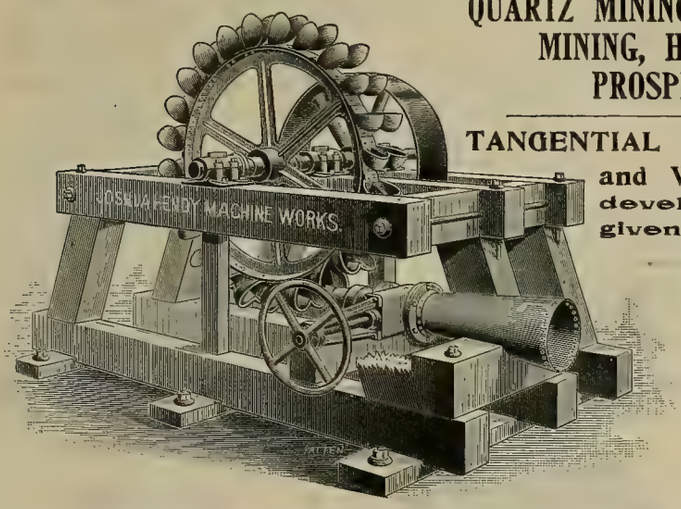

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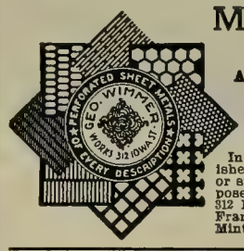

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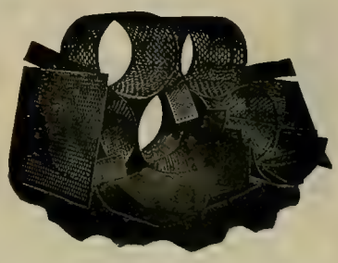

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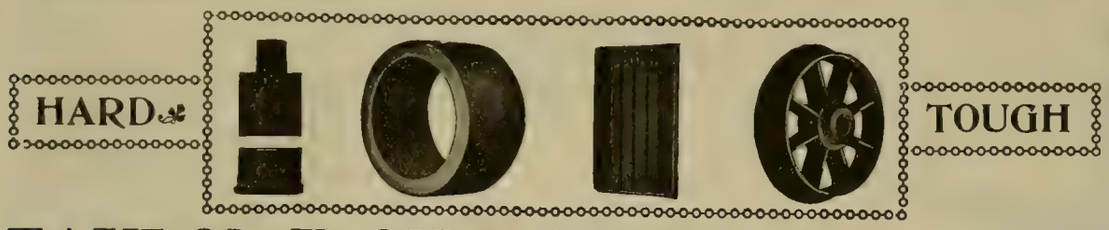

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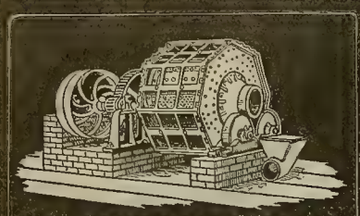

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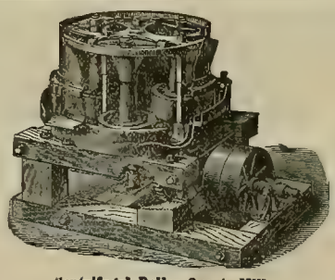

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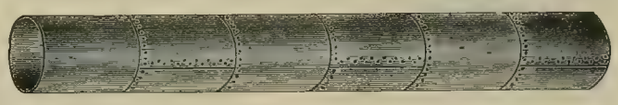

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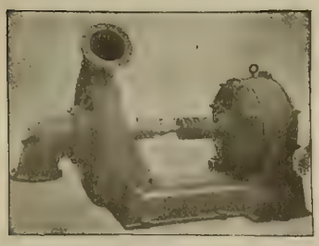

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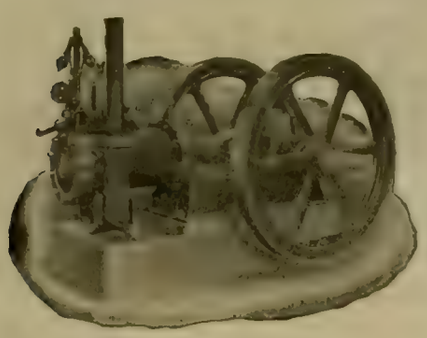

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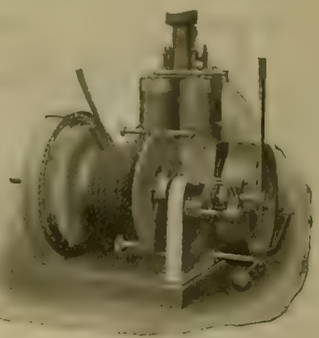

ASSESSMENT NOTICES.

YUBA CONSOLIDATED GOLD MINING COMPANY.—Location of principal place of business, San Francisco, California; location of works, Nevada County, California.

Notice is hereby given, that at a meeting of the Board of Directors, held on the 10th day of May, 1901, an assessment (No. 1) of one (1) cent per share was levied upon the capital stock of the corporation, payable immediately in United States gold coin to the secretary, at the office of the company, Room 801, Claus Spreckels Building, San Francisco, California.

Any stock upon which this assessment shall remain unpaid on the 25th day of June, 1901, will be delinquent and advertised for sale at public auction; and unless payment is made before, will be sold on MONDAY, the 15th day of July, 1901, to pay the delinquent assessment, together with the costs of advertising and expenses of sale.

By order of the Board of Directors.

EDWARD H. STEARNS, Secretary.

Office—Room 801, Claus Spreckels Building, San Francisco, California.

INYO MARBLE COMPANY OF CALIFORNIA.—Location of principal place of business, San Francisco, California; location of works, Inyo, Inyo County, California.

Notice is hereby given, that at a meeting of the Board of Directors, held on the 27th day of May, 1901, an assessment (No. 34) of five (5) cents per share was levied upon the capital stock of the corporation, payable immediately in United States gold coin, to the secretary, at the office of the company, room 31, tenth floor, Mills Building, San Francisco, California.

Any stock upon which this assessment shall remain unpaid on the 8th day of July, 1901, will be delinquent and advertised for sale at public auction; and unless payment is made before, will be sold on TUESDAY, the 6th day of August, 1901, to pay the delinquent assessment, together with the costs of advertising and expenses of sale.

By order of the Board of Directors.

CHARLES E. ANDERSON, Secretary.

Office—Room 31, tenth floor, Mills Building, San Francisco, California.

WILLIETTA MINING & MILLING COMPANY.—Location of principal place of business, San Francisco, California; location of works, Tuolumne County, California.

Notice is hereby given, that at a meeting of the Board of Directors, held on the 11th day of June, 1901, an assessment (No. 1) of one (1) cent per share was levied upon the capital stock of the corporation, payable immediately in United States gold coin, to the secretary, at the office of the company, Room 8, 206 Sansome street, San Francisco, California.

Any stock upon which this assessment shall remain unpaid on the 20th day of July, 1901, will be delinquent, and advertised for sale at public auction; and unless payment is made before, will be sold on MONDAY, the 12th day of August, 1901, to pay the delinquent assessment, together with the costs of advertising and expenses of sale.

By order of the Board of Directors.

FRANK E. CORDES, Secretary.

Office—Room 8, 206 Sansome street, San Francisco, California.

MARIPOSA COMMERCIAL AND MINING COMPANY.—Location of principal place of business, San Francisco, California; location of works, Mariposa County, California.

Notice is hereby given, that at a meeting of the Board of Directors, held on the 15th day of June, 1901, an assessment (No. 23) of Ten ($10) Dollars per share was levied upon the capital stock of the corporation, payable immediately in United States gold coin, to the secretary, at the office of the company, Room 223 Crocker Building, San Francisco, California.

Any stock upon which this assessment shall remain unpaid on the 10th day of August, 1901, will be delinquent, and advertised for sale at public auction; and unless payment is made before, will be sold on MONDAY, the 2nd day of September, 1901, to pay the delinquent assessment, together with the costs of advertising and expenses of sale.

By order of the Board of Directors.

ALEX. GRANGER, Secretary.

Office—Room 223 Crocker Building, San Francisco, California.

TANANA MINING COMPANY.—Location of principal place of business, San Francisco, California.

Notice is hereby given, that at a meeting of the Board of Directors, held on the 14th day of June, 1901, an assessment (No. 3) of ten (10) cents per share was levied upon the capital stock of the corporation, payable immediately in United States gold coin, to the secretary, at the office of the company, Room 801 Claus Spreckels Building, San Francisco, California.

Any stock upon which this assessment shall remain unpaid on the 23d day of July, 1901, will be delinquent, and advertised for sale at public auction; and unless payment is made before, will be sold on TUESDAY, the 13th day of August, 1901, to pay the delinquent assessment, together with the costs of advertising and expenses of sale.

By order of the Board of Directors.

EDWARD H. STEARNS, Secretary.

Office—Room 801 Claus Spreckels Building, San Francisco, California.

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DELINQUENT SALE NOTICE.

AMERICAN OIL AND REFINERY COMPANY.—Location of principal place of business, San Francisco, California; location of works, Contra Costa County, California.

NOTICE.—There are delinquent upon the following described stock, on account of assessment (No. 3) levied on the 26th day of March, 1901, the several amounts set opposite the names of the respective shareholders, as follows:

Names.	No. Cert.	No. Shares.	Amt.
Allen, S. L.	110	12	$ 60
Anderson, Mrs. Lulu	270	2	10
Anthony, J. C., Trustee	797	1,000	50 00
Anthony, J. C., Trustee	798	1,000	50 00
Anthony, J. C., Trustee	799	1,000	50 00
Anthony, J. C., Trustee	800	500	25 00
Anthony, J. C., Trustee	801	500	25 00
Anthony, J. C., Trustee	802	500	25 00
Anthony, J. C., Trustee	803	500	25 00
Anthony, J. C., Trustee	531	500	25 00
Anthony, J. C., Trustee	973	1,000	50 00
Anthony, J. C., Trustee	1021	4,300	215 00
Avery, Mrs. Jennie	716	5	25
Avery, Mrs. Jennie	729	5	25
Barto, Harrison	808	2,500	125 00
Barto, Harrison	812	500	25 00
Barto, Harrison	813	500	25 00
Barto, Harrison	814	500	25 00
Benecke, Diederich	93	1	05
Bgorkman, Mrs. Augusta	712	35	1 75
Brown, Mrs. Ida M	152	7	35
Buckley, Morris	788	50	2 50
Carr, H. W.	719	5	25
Conn, Mrs. Sarah A.	529	20	1 00
Conn, Mrs. S. A	693	25	1 25
Corbiere, C. C.	564	250	12 50
Corbiere, C. C.	565	5	25
Crew, L. T.	206	2	10
Cridge, A. D.	501	1	05
Cumberson, Mrs. Maria L.	171	5	25
Donnelly, Mary M.	49	14	70
Dunlap, Mrs. W. B.	526	10	50
Donahue, Benj. S.	1141	500	25 00
Eells, Charles P.	984	2,000	100 00
Eells, Charles P.	1127	10,000	500 00
Estey, J. C.	1045	100	5 00
Estey, J. C.	1048	20	1 00
Falls, Sarah	557	40	2 00
Fetrow, Mrs Maria W.	172	3	15
Fisk, Andrew J.	366	2	10
Freese, A. J.	6	40	2 00
Freese, A. J.	7	40	2 00
Freese, A. J.	9	50	2 50
Freese, A. J.	278	10	50
Freese, A. J.	279	10	50
Freese, A. J.	280	20	1 00
Freese, A. J.	281	20	1 00
Freese, A. J.	282	20	1 00
Freese, A. J.	283	20	1 00
Freese, A. J.	284	345	17 25
Freese, A. J.	450	20	1 00
Freese, A. J.	659	50	2 50
Freese, A. J.	671	9	45
Hildebrandt, Henry	256	65	3 25
Hildebrandt, Henry	257	100	5 00
Hildebrandt, Henry	258	1,000	50 00
Hoover, John D., Trustee	981	667	33 35
Hoover, John D., Trustee	1060	433	21 65
Hoover, Miss Esther	979	100	5 00
Holbrook, W. E., Trustee	897	10,000	500 00
Holbrook, W. E., Trustee	898	11,000	550 00
Holbrook, W. E., Trustee	899	4,500	225 00
Holbrook, W. E., Trustee	900	4,500	225 00
Holbrook, W. E., Trustee	958	2,000	100 00
Holbrook, W. E., Trustee	959	2,000	100 00
Holbrook, W. E., Trustee	960	2,000	100 00
Holbrook, W. E., Trustee	974	2,000	100 00
Holbrook, W. E., Trustee	994	1,200	60 00
Holbrook, W. E., Trustee	995	1,000	50 00
Holbrook, W. E., Trustee	996	1,000	50 00
Holbrook, W. E., Trustee	997	1,000	50 00
Holbrook, W. E., Trustee	998	1,000	50 00
Holbrook, W. E., Trustee	999	1,000	50 00
Holbrook, W. E., Trustee	1000	1,000	50 00
Holbrook, W. E., Trustee	1001	1,000	50 00
Holbrook, W. E., Trustee	1118	2,000	100 00
Holbrook, W. E., Trustee	1119	2,000	100 00
Holbrook, W. E., Trustee	1123	2,000	100 00
Kessing, E. L.	838	15	75
Lucas, Mrs. T. R.	848	10	50
McCuen, Mrs. N.	305	2	10
McAllister, H. L.	1071	100	5 00
Murrey, Peter William	70	1	05
Niederost, August	207	28	1 40
Opitz, Conrad E.	343	10	50
Peters, W. S.	60	15	75
Peters, W. S.	334	500	25 00
Peters, W. S.	672	5	25
Pipher Jos. E.	102	2	10
Reynolds, Timothy	21	5	25
Schindler, Louis C.	303	2	10
Shead, Mrs. Dora L.	920	100	5 00
Smith, James B., Trustee	985	1,000	50 00
Smith, James B., Trustee	986	1,000	50 00
Smith, James B., Trustee	987	1,000	50 00
Smith, James B., Trustee	988	1,000	50 00
Smith, James B., Trustee	989	1,000	50 00
Smith, James B., Trustee	990	1,000	50 00
Smith, James B., Trustee	991	1,000	50 00
Smith, James B., Trustee	992	500	25 00
Tarpey, W. J.	675	14	70
Walser, Mrs. Lizzie	332	125	6 25
Young, Richard	746	91	4 55
Young, Richard	754	167	8 35
Young, Richard	758	100	5 00
Young, Richard	761	328	16 40

And in accordance with law, and an order from the Board of Directors, made on the 26th day of March, 1901, so many shares of each parcel of such stock as may be necessary, will be sold at public auction at the office of said corporation, in Rooms 322-323 Parrott building, San Francisco, California, on MONDAY, the 27th day of May, 1901, at the hour of 1 o'clock P.M. of said day, to pay said delinquent assessment thereon, together with costs of advertising and expenses of sale.

J. C. ANTHONY, Secretary.

Office—Rooms 322-323 Parrott building, 825 to 855 Market St., San Francisco, California.

POSTPONEMENT.

By order of the Board of Directors, the day of sale of the above delinquent stock has been postponed to MONDAY, the 24th day of June, 1901, at the hour of 1 o'clock P. M., at the office of said corporation in Rooms 322-323 Parrott building, San Francisco, California.

J. C. ANTHONY, Secretary.

Office—Rooms 322-323 Parrott building, 825 to 855 Market St., San Francisco, California.

DELINQUENT SALE NOTICE

NATIONAL CONSOLIDATED MINING COMPANY.—Location of principal place of business, San Francisco, California; location of works, Rich Gulch, Shasta County, California.

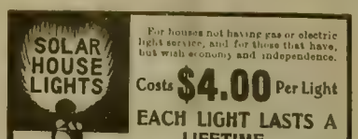
Notice.—There are delinquent upon the following described stock on account of assessment (No. 14) levied on the 16th day of April, 1901, the several amounts opposite the names of the respective shareholders, as follows:

Names.	No. Cert.	No. Shares.	Amt.
F. Strueven	163	20	1 00
T. Vogel	227	150	7 50

And in accordance with law, and an order from the Board of Directors, made on the 16th day of April, 1901, so many shares of each parcel of such stock as may be necessary will be sold at public auction at the office of the company No. 773 Mission street, San Francisco, California, on TUESDAY, the 25th day of June, 1901, at the hour of 1 o'clock P. M. of said day, to pay said delinquent assessment thereon, together with costs of advertising and expenses of sale.

GEO. W. FLEISSNER, Secretary.

Office—773 Mission street, San Francisco, California



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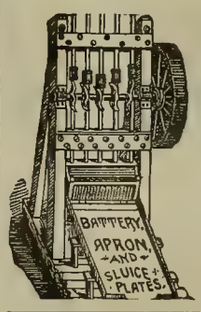

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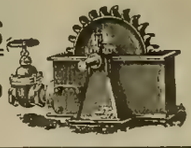

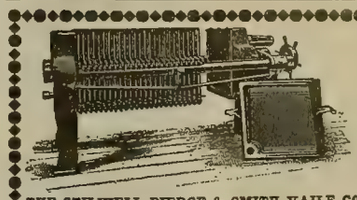

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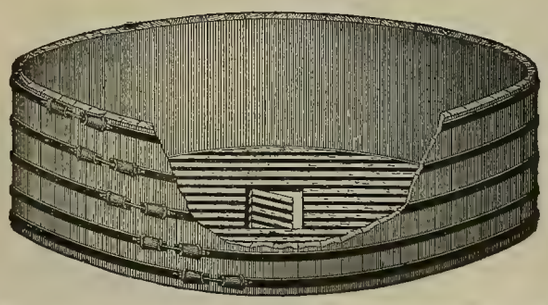

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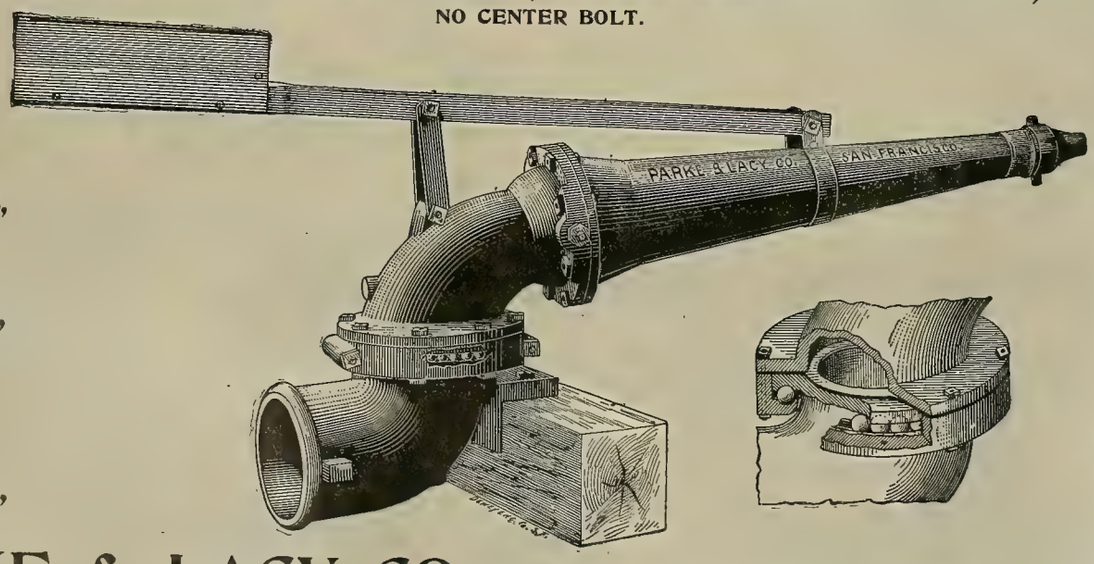

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MINING AND SCIENTIFIC PRESS.

Whole No. 2136.—VOLUME LXXXII. Number 26. SAN FRANCISCO, SATURDAY, JUNE 29, 1901. THREE DOLLARS PER ANNUM. Single Copies, Ten Cents.

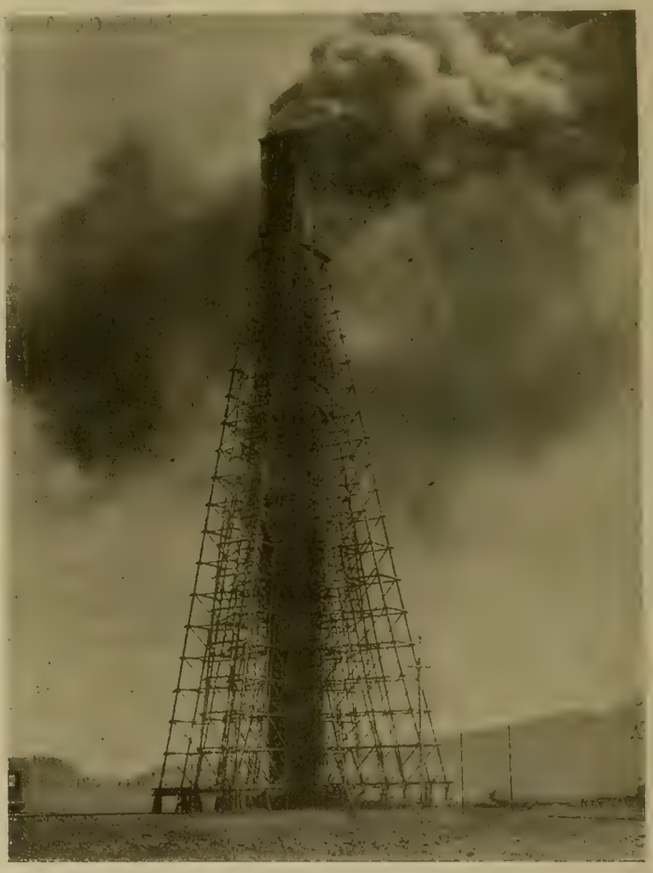
Wooden Smelter Stack at Mapimi, Mexico.

Written for the MINING AND SCIENTIFIC PRESS by WM. MAGENAU.

Accompanying is given an illustration of a unique construction of smelter stack, which commends itself for cheapness and durability under such conditions, especially as remoteness from brick manufacturing centers and low price of timber.

The stack shown was built by the Compania Minera de Penoles at Mapimi, Durango, Mexico, in 1897 at a cost of about $10,000, Mexican currency. It is estimated that a brick stack of the same capacity would have cost $40,000. It is 180 feet high and 10 feet square, the body being constructed of ordinary 1-inch matched flooring lumber, and inside of this is a lining of No. 22 corrugated roofing iron. The bracing, which is a permanent part of the structure, is built of 4x6 inch and 6x6 inch timber with a little 8x8 inch. It was built in six weeks, a contractor and one carpenter being the only white men employed, cheap Mexican labor doing most of the work. Lumber at Mapimi cost at the time $60, Mexican, per M. feet.

Danger of fire seems at first thought the greatest objection to this kind of stack; but, with a few simple arrangements and proper watchfulness, any serious trouble from this source can be avoided. In three years steady operation this stack has been afire only three times, and was then promptly extinguished. A platform has been built every 40 feet and at each a length of hose attached to a 2-inch water main is provided. When the iron lining burns out at any point the issuing smoke is noticed at once from the yard below, and, all parts being quickly accessible, serious damage is averted. The lining lasts well, the Mapimi stack being in good condition after over three years of service with highly arsenical fumes from between four and six sixty-ton blast furnaces.



Wooden Smelter Stack, Mapimi, Mexico.

The Renaissance of Mines.

The mining of to-day is in many localities a revival of successful exploitation where it was supposed there was nothing to exploit. Great metal values are coming not only from new discoveries in new districts, but as well from a renaissance of old mines in old districts. There are fashions in mines as well as in lighter things. After the discovery of gold in California, and for a dozen years following, this State dominated the imaginations and pockets of men. It was the only gold land—the only territory for the investment of capital in mines, and gold mining was the only mining. A great industry for the time was developed, hundreds of gold mining propositions were promoted, great mills were erected, and all flourished like weeds in a California springtime till the fashion of putting money in California gold mines was changed by the dazzling yield of the Nevada silver mines.

Silver mines and Nevada then for a dozen years and more were the source and scene of the wealth-getting activity in mining. The Comstock, first always, then White Pine, Eureka, Austin, Pioche, Candelaria, drew men and wealth, built cities and fortunes, all on silver, in Nevada, till again the resources of promotion and quick bonanza returns lagged and fashion in mines turned again her face, and the followers of the fickle dame spread over new lands and in turn sought other metals and many strange minerals.

Utah, Arizona, Colorado, Idaho, Montana, Oregon, South Dakota and, notable in foreign countries, the Australian colonies, New Zealand, Transvaal, Mexico, British Columbia and the Klondike, together or in turn each has been the fashion for mines. In some the hold on public interest has been unbroken. The older exploited districts, like California and Nevada, had brief glories of intense effort and dazzling yield of metallic wealth, to be followed with longer periods of silent rusting machinery, caving underground works and decaying structures.

These mines of past days are now again becoming the fashion. The last ten years have witnessed renaissance after renaissance of mines of old mining camps in the Nevada and Arizona deserts, in Colorado and Oregon mountains.

The miners of forty years ago will remember the Lost Confidence mine of Shasta, Cal., that allured and wrecked the hopes and pockets of many a miner in the old days. Now it is the Mountain Mines, Ltd., and earns enormous dividends for people who never saw a mine. When in the old days it was the first fashion, it was the gold face of the shield men saw; later other men looked on it and said shield was silver. The men who look on it not at all, now say it is copper.

Truly, there is nothing so fickle as the fashion of mines —except the mines.

Golden Star Mine and Mill, Blaine Co., Idaho. (See page 293.)

MINING AND SCIENTIFIC PRESS.

ESTABLISHED 1860.

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W. D. CURTIS.....223 W. Second St., Los Angeles, Cal.

San Francisco, June 29, 1901.

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THE low price of lead and the consequent depressing effect on silver-lead ore production are turning the attention of British Columbia miners to gold mining, and the experience of Colorado is being repeated. Numerous gold-bearing lodes and districts are being discovered and explored with exceedingly encouraging development. While no new Cripple Creek is reported, the prospects seem good for the making of a gold mining industry that will soon exceed in magnitude the diminishing silver-lead mining.

A SUBSCRIBER writes us from Lead, S. D., that he suggested to Senator Pettigrew the idea of a home for old prospectors some six years ago. This paper hopes more of its readers will do the same thing—suggest to United States Senators and Congressmen and delegates to the Mining Congress at Boise, Idaho, the idea of a home for old prospectors. It is quite properly a matter on which the Mining Congress can make a declaration of what it deems just and generous in recognition of the services of men who pioneered for the mining industry.

THE Electrical Review, in discussing the conventions, pertinently suggests that the places selected for meetings should preferably be watering places or small cities, combining natural beauties, good hotel accommodations, and an absence of features tending to draw away the attention of members, rather than the great cities, where there are overpowering counter attractions. The suggestion has an added pertinence here in the far West, where the convention habit has developed the art of convention exploitation among our thrifty, hospitable people. Really, a convention in San Francisco has little time left, and the members little opportunity left, after accepting the good will and attractions showered on them, for the real business of a meeting. Perhaps it's just as well, in the end, but the meetings have legitimate purposes and it would seem that conditions and environment should be provided to keep these purposes clearly in the fore of everything else. San Francisco has been mentioned, among others, as a place for the next meeting of the International Mining Congress that meets this year at Boise, Idaho. Los Angeles would be a better place, a better still would be Santa Catalina island. That would be almost ideal. There is no telegraph, no telephone, no railroad, no daily paper. There is charming natural beauty, a climate that inspires mental effort and rests the body, and hotel accommodations all that could be desired.

The Position of Lead Mining.

The price of lead at $4 to the miners at the smelters has been kept up by the latter since the beginning of 1900. That is to say, left to itself without the support of these selling interests the price of lead, fixed by buyer's demands for consumption, and the uncontrolled supply of production, would have been below $3 a hundred, possibly as low as $2.50. At a comparatively slight reduction below $4 many of the lead-silver mines operating would have had, first, the profit margin for mine dividends wiped out, and ultimately would have been forced to shut down or operate under a heavy loss, which is unthinkable. The contracts under which the price has been kept up to the miners, terminating on Jan. 1st next, the question of the new contracts to go into effect then are now up for consideration between the mine operators and the American Smelting & Refining Co. The contract offered by the smelting company is not acceptable to the mine operators.

On its part the smelting company, speaking through one of its principal men, J. B. Grant, claims that "the company is doing the best it can to build up the price of lead at a heavy loss, as everyone knows who looks into the matter, and there must be a reduction or there will come a break that will be ruinous. At $4 per 100 pounds the producers are receiving a cent a pound above the market. There is no justice in holding the smelter company responsible for a situation which it has no means of controlling. The fact that there is an overproduction is well known, and ordinary commercial rules cover all matters of that kind."

On the other hand, the miners who deal with the smelting company admit that there is an overproduction of lead for the lead market. They claim, at least the Cœur d'Alene lead-silver mine operators do, that they are paying $1 a ton more for transportation and treatment than paid under the contract preceding the existing one, and that since March, 1901, at the request of the smelting company, they have been restricting their production one-third. The request of the smelting company was the statement that they had 40,000 tons of surplus pig lead in stock and 25,000 more tons in ores, and in order to reduce this they must decline to receive the full mine production. Generally, the mine operators claim that they can not operate their mines at a reduction in the price of lead.

Both parties agree on the fact of overproduction. There can be no reasonable question as to the fact that the smelting company is doing the best it can to build up the price. Its statement of surplus stock demonstrates that. Its claim that it is doing so at a heavy loss to itself is not as convincingly obvious as general acceptance of the statement would imply. The recent consolidation of the rival smelting companies made public through judicial findings of fact that one of the two companies that made the new company put its property into it for $45,000,000 out of $100,000,000 of the total capitalization, with an exhibit of actual cash investment in plant and operative capital of not more than $23,000,000. It is not to be presumed that the other company did any more proportionally, so that its cash investment representing $55,000,000 of the new capital would be about $28,000,000. This would make $51,000,000 cash investment for the present company, or, to eliminate any question of understatement of cash investment and cash capital, place it at $70,000,000. The company recently declared a dividend on its common stock at the rate of 7% a year. In addition, it paid dividends on its preferred stock and interest on its bonds. In round numbers its net earnings have been between $12,000,000 and $14,000,000 a year—between 17% and 20% on $70,000,000 of investment. The smelting business has thus paid the smelting company as a whole even if it did sell lead for less than direct cost to it. Accepting the claim of heavy loss as a fact—though the authoritative statement of numerical value in dollars of "heavy" would be a valuable aid to a clear comprehension of just what the phrase means—the net earnings of the smelting and refining of gold, silver and other metals must have produced the $12,000,000 to $14,000,000 of net profits and in addition the numerical value of "heavy" loss.

Briefly, the final net profits of the entire smelting business do not appear to be reduced, and the "loss" by buying lead for more than it is subsequently resold for has been, so far as the smelters were concerned, an additional cost charge on the treatment of gold, silver and copper ores. It is not the smelting company which has made a loss from the lead smelting, it is the miners of other metals. The recent raising of charges by the smelting company is part of the business of passing this loss to the other metal miners. A comparison of the total net profits of the smelting company with the total value of the smelting company production at sale values of the metals other than lead, and with the net earnings of the mines that supplied the ores of these metals, cannot fail to be instructive and suggestive to the mine operators, who, rather than invest their own capital in reduction works, legitimately part of their mining business, pay for that service the larger part of their possible profits. It might be suggested that treatment by custom smelters may make a mine but it certainly does not make a good business.

The claim that there is no justice in holding the smelter company responsible for the situation which it has no means of controlling may be conceded without argument. It would seem, however, that its maintaining of the price above the market is in part responsible for the creation of the situation. It has made a profit for lead-silver ore mining in mines that could otherwise not have operated, and it has stimulated the opening of new mines, not alone in its own buying field, but in the competing Missouri district as well. The artificially maintained profit-earning price has been to the lead-mining industry a medicine which, postponing the penalty settlement for overproduction, has meanwhile increased it and made it chronic. It would have been much better industrially for the few to have lost in the beginning rather than that the many should lose now. But the smelting companies could not have made their net earnings of the last two years so large without the use of the surplus of lead-ore production, and some lead-silver mines would not have paid dividends. These facts may be conceded too. On the other hand these mines and more will have to shut down now indefinitely unless the smelting company abandons finally the effort to maintain the price of lead and treats it simply as a by-product of its smelting operations, buying it from miners like limestone or other fluxing material. It will have to pay miners a profit on mining, or own its own mines. It may have to increase treatment charges for other metal ores to correspond with the increase in its cost charges. It would risk in so doing the offering of the quantity of those ores. It risks the maintenance of its present high rate of earning. But, on the other hand, by substituting a true basis of operation for a false one, the general business of mining has some of its risks eliminated and is to that extent made more safe and surely profit earning.

The preceding has suggested the heroic remedy for the industry, namely, the business recognition of the facts of overproduction and the basing of future business in the industry on the fact that the condition is permanent. Lead consumption will not expand under low prices very largely. It is not like copper consumption. Reduce the price of copper a few cents, and it displaces aluminum for many uses; a few cents more, and it becomes a substitute for steel and iron for many services; a few cents more, and it displaces, directly and in alloys, more of these and other metals. Consumption with copper closes immediately on an increased production, which lowers the market price. It is not so with lead, and there is more lead than copper that is minable. It does not seem as if increased use could absorb overproduction with lowered market price.

The plan of a combination to restrict production is suggested. One practically exists now except as to the inclusion of Missouri lead mines. The suggestion then means that the Missouri mines shall enter into the practical combination that already exists between the smelting company and the Rocky mountain lead miners. What have the Missouri mine operators to gain by such action? What have the other two parties to give? It is not difficult to see the smelting company as an almost sure beneficiary of such a combination. The Rocky mountain miner of the purely lead-silver ores might make a less amount than at present, but would be making something. The Missouri miners, however, would have to be insured a larger profit from a high market price and a

small production than he can get from the low price and a large production. Mining costs in Missouri are low—principally labor; investment in plant is small compared with investments in the Rocky mountains, smelting costs are lower and refining is not required to the extent at least that the Rocky mountain lead requires, and transportation to market is but a fraction, not more than one-fourth of the costs against Rocky mountain lead. The market price can be lowered far down below present price and yet leave a profit that would be taken as fair compensation by Missouri miners. If they cannot make a profit a shut down makes little or no loss to operators. Perhaps the Missouri miners can be induced to join a combination that will keep the price of lead high enough to make it pay both the smelting company and the Rocky mountain miner. But the Missouri miners will have to be paid. Who will pay? The silver-lead miners claim they cannot stand a reduction in the price of lead, or even the chance of it; they cannot then pay anything. The smelting company could pay by taking it from the net profits of its smelting and refining business other than lead. The Rocky mountain miners of gold and other metals could pay, but why should they? It is not their business that is in need of medicine.

A combination of this nature has another natural destroyer that has to be reckoned with. The advance of metallurgical science is resolving many complex ores carrying lead as a constituent of minor value. These ores carry gold enough, alone, or value enough in the gold and recoverable metals other than lead, to make their mining profitable, and the lead is then an unavoidable by-product which will go on the market for sale at any price. The amount of lead product from these ores is increasing rapidly independent of the market price of lead, and if there be made a combination to restrict production, this lead production will get a premium at the expense of the combination production just exactly as Missouri lead production is receiving one now.

Summarizing, there is a chronic condition of overproduction of lead. Left to itself, the market price would descend below the cost of production from Rocky mountain lead-silver mines, and the restriction of production to a new and lower market price level would be effected by the closing down of mines that would not pay. The price might be maintained by an all-embracing combination, but the motive—profit from such combination, to induce the joining of the controlling, least costly production—would seem hard to provide. On the other hand, the smelters must have the lead ores to smelt and refine gold and silver ores. A limiting of the quantity they use makes a limitation in the quantity of other ores they can treat. Treating other ores without limit, the only position of lead is as a necessary component of furnace charges, that must in marketing take a value independent of its cost.

Should large-consuming new uses be found for lead that would sustain the price, this summary would be modified accordingly.

THE State is ready to buy a quarter of a million dollars worth of redwood lands for a State park in the district known as the Big Basin in Santa Cruz and San Mateo counties, an appropriation of $250,000 having been made for that purpose by the last Legislature. At a meeting held in this city on Tuesday, Governor Gage presiding, a resolution was adopted declaring the commission ready to receive proposals for the sale of lands, and it was also proposed that only such tracts of lands as are contiguous to each other be bought. The commission will visit the basin in July or August.

Concentrates.

THE Canadian Minister of the Interior has promised that an assay office shall be established at Victoria.

PRESSED STEEL BARRELS are now manufactured and are extensively used for the transportation of oils and other fluids.

THE United States in 1900 again took first place in the production of gold, $118,435,562 as compared with $99,-158,948 in 1899.

THE cost of making a barrel of cement in a mill that makes 1000 barrels a day is about $1. The greater the output the less the cost.

CAST IRON is comparatively a modern invention and dates only from the beginning of the fifteenth century, though wrought iron was known in the time of the pyramids, more than 3000 years B. C.

A TRIAL COURT in Colorado has decided that the State law requiring mine owners to board over or fence shafts can not be enforced, as it is included in a statute, the title of which declared the object of it to establish the State Bureau of Mines.

IN a wooden car, weight 30,000 pounds empty, and 60,-000 pounds loaded, the ratio of load to full weight when loaded is 66.67%, while with a pressed steel ore car of 100,-000 pounds capacity the ratio of load to total loaded weight is about 78.1%.

THE utilization of blast-furnace gases in gas engines has been so successful that half of the gases from a furnace producing 150 tons of pig iron a day will produce in gas engines 3500 H. P., while the same gas used to make steam in boilers will only produce 1000 H. P.

A SUCCESSFUL system of dust fuel burning has been worked out in connection with cement manufacture, and from it a system of boiler firing that is reliable and economical has been developed. With the use of the dust fuel the combustion is so perfect that there is no smoke.

FROM the study of the chemistry of the soil, it has been determined that the most barren lands can be made capable of supporting plant life by the addition of potash, phosphoric acid and nitrogen. The latter can be accomplished largely by culture in plants absorbing nitrogen from the air.

THE metric system of measures is exclusively employed in all the countries of continental Europe except Russia and there its employment is not only permissable but common. The export of U. S. manufactures is at considerable disadvantage through the use of the English measures.

IN 1880 the United States produced only 42,000 barrels of Portland cement. In 1895 the production was 1,000,-000 barrels; in 1896, 1,500,000 barrels; in 1897, 2,677,755 barrels; in 1899, 5,650,000 barrels; in 1890, over 7,000,000 barrels, and for 1901 it is estimated it will be about 12,-000,000 barrels.

THE State of Wyoming through Prof. Knight of the State University has arranged for the making of geological surveys and map of Laramie valley. The work will be done by the U. S. Geological Survey, Prof. Knight being appointed to the field staff of the survey to facilitate the carrying on of the work in co-operation.

PROF. HENRY LANDIS, State Geologist of Washington, with his assistants, Prof. Solon Shedd, D. A. Lyon and W. S. Thyng, will organize parties and begin the geological survey of the State of Washington. The first work will deal more particularly with economic geology and the assistance of all engaged in mining is solicited for the gathering of preliminiary data.

CONGRESS has not yet made any change in the mining laws requiring assessment work to be done by October 1st of each year. The Senate Committee on Mining has recommended such a change to be made. Probably it will be, but the chance of its occurring based on experience in getting desirable changes made by Congress should not be permitted to alter arrangements for assessment work made in advance for many years.

THE petroleum producing area of Canada is in the southwestern part of the Province of Ontario. It contains in operation about 9000 wells, average pumping depth 465 feet, yielding nearly 60,000 barrels monthly. The ratio of crude petroleum to refined oil is about 100 to 40, requiring two and one-half barrels of crude to make one of refined. The manufacture is complicated and plant expensive, but from the mud-colored petroleum the final product is an illuminating oil clear as water.

A 10 H. P. GAS ENGINE with ordinary city gas at 54 cents per 1000 feet will cost for operation per H. P. hour $0.019—$1.90 for the 10 H. P. for ten hours. With the city gas at $0.81 per M. cubic feet, the H. P. cost will be $0.025 or $2.50 for 10 H. P. for ten hours. With the gas at $1.35 the cost per H. P. hour will be $0.037 or $3.70 for the engine for the ten-hour day. These costs correspond respectively to charges for electric power at $0.0253 per K. W. hour, $.0335 per K. W. hour and $0.0496 per K. W. hour.

THE standard requirements for tensile strength of cements have been increased till they are beyond what is required for ordinary work. Manufacturers have improved the tensile strength as rapidly as the requirements have been increased. A test for tensile strength gives a relative figure which can be used for comparison with some other cement, the value of which in use is known by experience and time. To make comparisons with former tests of any value, however, there must be a uniform method of making the tests which must be strictly followed.

MOLYBDENITE, sulphide of molybdenum, is quite a common mineral. Worthless until quite recently, its present commercial importance is for the purpose of making an alloy of the molybdenum with iron for certain desirable grades of steel. For this purpose the manufacturers first make what is called ferro-molybdenum, containing 50% of the latter. The latest New York quotation for this is $1.25 a pound. The demand is limited and it is not probable that the price will be maintained long. The high price received by the first miners of a commercial deposit has stimulated research, and reports of discoveries are coming from many localities. To be of commercial value the shipping grade of ore should not run under 50% of the mineral. The only buyers are the steel manufacturers.

THE Sweepstake placer mine, in Trinity county, Cal., was not formed by glacial action. It was formed long before the glacial epoch. In the Sierra Nevada mountains in California, where the geological phenomena have been very thoroughly studied out, the old gravels that contain gold are all pre-glacial. In fact, the evidence is conclusive that even the canyons of the present rivers are pre-glacial. On the eastern slope of the Sierras are some gold-bearing gravels that are glacial deposits; but even in these it is clear that most of the gravel and the gold were pre-glacial and only transported to their present place by glaciers which formed and moved in the old stream channels. Weaver Basin, the valley of Weaver creek, in which the town of Weaverville is located, and which has been noted for its enormous yield of gold, situated east and adjoining the Sweepstake placer, has been described as of glacial origin. The bedrock beneath the gravel is very deep, and is a depression which, the writer is informed, has no natural drainage from the bottom. On this structural anomaly seems to have been based the theory that the gold-bearing gravel filling of the depression was of glacial origin. The glacial deposit has been claimed to be a moraine 30 miles long and several miles wide, extending from Coffee creek on the north to the Trinity river, south of Weaverville. The La Grange hydraulic mine is considered to be in a part of this old glacial moraine. In this mine there are some evidences of glacial origin, but they can hardly be regarded as conclusive. In Weaver Basin the writer has observed no evidences of glacial origin of the deposit that are not with equal weight of reason referable to the ordinary phenomena of stream erosion. North of Weaverville, to Coffee creek, the gravels are covered with volcanics which are pre-glacial. The Sweepstake deposit seems to be nothing else but an undisturbed fragment of the first channel of what is now the Trinity river. It can be regarded as older than Neocene, the age given to the auriferous gravels of the Sierra Nevada mountains. It would seem to have a close connection in origin with the old river gravels and sands extending from a point 30 miles up the Klamath river to the sea coast at Gold Bluff. The land area of the mountain mass, including the Trinity watershed, is as old, if not older, than the land area now the Sierra Nevada range. Like the latter, it has been subjected to enormous sub-aerial erosion, and, like it, to enormous changes in regional elevation. Both denudation and changes of elevation are evidenced in the enormous thicknesses of the Cretaceous beds which lie on the eastern edge of the old land mass. These beds have been measured 30,000 feet in thickness, the material for them being derived largely from the erosion of the Trinity area of the land mass. Also, the submergence of the land-filled bedrock depression of the old channel of the Klamath at Gold Bluff and a high uplift of the Cretaceous beds are indicative of tremendous changes in elevation. These agencies all combined can reasonably account for the phenomena of the Sweepstake mine, without reference to glaciers. The Klamath river, above the junction with the Trinity at Orleans Bar, is comparatively a recent stream. It belongs to the period subsequent to the Neocene uplift succeeding the formation of the Cretaceous beds. The old Klamath main stream was the old Trinity. The latter, in Trinity county, in the headwaters region, has had certainly two, and very probably three, successive moves eastward from the line of which the Sweepstake is part to the present channel. The Sweepstake fragment seems to the writer clearly of the first and oldest of the channels. That fact alone would insure its being the richest. It can hardly be said to be an isolated fragment. There are other smaller and more or less richer fragments which seem to be parts of the system of river deposits of that age. One of them is at an elevation of over 7000 feet, on Mount Stirling. Another is west of Oro Fino, near the summit of the Salmon mountains. A third is the gravel channel, carrying gold, on the summit of the Salmon mountains occupying the pass between the headwaters of Coffee creek and the South Fork of the Salmon river. And there are a number of other points, all high up on the slopes or even the summits of the main mountain uplift; so that while the evidence of stream erosion formation was plainly to be read in the placers themselves, their position seemed inexplicable on that theory. The explanation is: Great age and enormous regional movement extending through several geological periods, during which the area has been continuously land. The Sweepstake is a larger remnant of this enormously old erosion—that is all. It is notable that in all of these deposits much of the gravel has disintegrated and become fragmental. It would seem as if Weaver Basin, in addition to its own erosion, represented in its gold and gravel the secondary accumulation of both from eroded portions of the older deposit. The same is probably the case with the La Grange hydraulic deposit. There is, however, nothing inconsistent in glacial phenomena having contributed to their formation; but the contribution of formation was a minor element of the real origin. An inspection of the maps of northwestern California, particularly the geological maps of the old Klamath area—island it is called by Diller and others of the U. S. Geological survey; but the island condition was only during the later Cretaceous; before that, during the early Cretaceous, it was part of the continental land mass, as it is now—an inspection of these maps will illustrate the logical basis on which the preceding statements are based.

Blaine County, Idaho.*

[STAFF CORRESPONDENCE.]

When, in 1884, the Wood river branch of the Oregon Short Line was built 60 miles northward from Shoshone, the chief interest centered in the lead-silver mines near Hailey, Ketchum and Bellevue; and while that class of mining here was much depressed for a number of years, there has been a steady improvement during the past three years, due mainly to the good price of lead and the closer methods of mining and concentration. This lead belt extends from Bellevue northward to a point above Ketchum, in the main lying on the west side of Wood river. The following are the names of the principal silver-lead mines of the belt, with the approximate record of their production between 1886 and 1900:

	Average value per ton.	Total output.
Minnie Moore	$124	$ 6,416,737
Bullion	166	1,309,037
Queen of Hills	124	995,598
Idahoan	115	899,525
Mayflower	204	883,275
Red Cloud	96	705,928
Jay Gould	126	536,640
Red Elephant	96	346,822
Eureka	119	141,162
Idaho Democrat	123	198,481
War Dance	116	126,018
Star	123	92,647
Wolf Tone	107	75,155
Narrow Gauge	110	59,299
O. K.	127	55,022
Nay Aug	123	44,583
Davitt	115	39,516
Bay State	195	25,219
Frenchman	113	12,970
Whale	105	10,476
Valley View	200	7,802
Montana	135	6,928
Chicago & Parnell	107	5,413
Bullwhacker	121	2,785
Caledonia	171	2,574
Garfield	117	1,908
Totals	$118	$12,940,431

During the depression from 1893 to 1896 most of these properties were practically closed down, and those which have since then resumed have done so under lease.

The Red Cloud is operating under lease to Lyttleton Price, the title being in a trustee for the former ownership. The holdings embrace two veins, which were opened at the surface and worked downward. Some time ago a deep tunnel was driven to crosscut the veins, the effort not having been successful by reason of a faulted formation at that depth. However, at a point 2600 feet from the tunnel entrance an upraise was made 300 feet to the lowest working level, through which the ore from all the levels is conveyed to the tunnel level by a double-drum gravity tram line, carrying a cage in one compartment and a counterpoise in the other. The ore is shipped out through the tunnel. Within the last one and one-half years about 1800 tons of ore have been shipped, which brought $127,000. While in the main this is a lead-silver ore, the above product included $20,000 in gold. Part of the ore is milled through a jig and table concentrator situate at the mouth of the tunnel. The Red Cloud is on Deer creek, 6 miles west of Hailey.

The above-named mine belongs in the original lead-silver belt, but the following information pertains to the more recently developed gold belt, which is located 10 to 14 miles west of Hailey. Exploration and development here show that there are three east-west fissures cutting through a granite formation, but apparently along porphyry dikes. The Tip Top mine is on the center fissure, the Hattie and Jumbo on the north, and the Golden Star and Black Cinder on the south fissure. These leads are ½ mile or more apart. On the Golden Star there is a granite hanging wall and a porphyry foot wall, but it is said the order is reversed in other mines.

The principal property of the gold belt, so far as development and production are concerned, is the Tip Top. It belongs to J. Q. Packard of Salt Lake City, and has been opened, developed and equipped under the superintendency of J. A. Lusk. The development is through two incline shafts, 550 feet apart, each following the dip of the vein. The west shaft goes down 500 feet from a point on top of the hill. The east shaft sinks 700 feet from a point 150 feet lower. The first, second, third, fourth and fifth levels pass along the vein from one shaft to the other. The sixth and seventh levels are being run westward from the east shaft, cutting below the base of the west shaft. Drifting also follows the ore at various levels eastward from the east shaft, the work having gone 150 feet at one level. The vein stands 30 to 70 feet wide, carrying gold in an iron and copper pyrite gangue, being heavy in iron and quite siliceous. The vein matter contains much porphyritic material, the ore streaks often running between bodies of porphyry. Most of the ore is hoisted through the east shaft, dumped into bins, the latter discharging into cars, by which the ore is delivered to the crusher at the top of the mill. From the crusher the ore passes through automatic feeders to the four 5-stamp batteries, each stamp being an 850-pounder, dropping about ninety-five per minute. Below the battery are amalgamating plates, on which about 30% of the saving is made. The material passes from the plates to four corrugated belt concentrators, which make a heavy, coarse concentrate. The tailings from the latter pass to hydraulic sizers, which make a separate sizing for each of the six smooth-belt vanners on the floor below, on which the final products are made in the form of finer concentrates. The product will run about 40% iron, the silica having been reduced to 6% or 8%. The waste tailings pass to settlers, the clear water is drawn off to a sump and pumped to a tank near the top of the mill to use over again. A considerable volume of water used in the mill comes from the mine, but the great bulk is pumped from a well a mile or so down the gulch, where there is a large pumping plant. The mill is operated by a Corliss engine and a set of Scotch marine boilers. At the mine is an ample steam hoist and an air compressor. The mill is handling fifty to sixty tons of ore per day.

North of the Tip Top, on the north fissure, is the Hattie, on which the ore body has been uncovered by considerable open cut work. A shaft is to be sunk on the vein and a tunnel is to be driven to cut 150 feet under present workings. The ores thus far obtained are well oxidized, heavy in iron, with a small percentage of copper, and are said to carry an average of $10 gold to the ton. A 20-stamp mill, with plates and concentrators, is being completed, and which is expected to be operating within a few weeks. H. H. Cullum is manager, the Hattie G. & C. M. Co., who own the property, being Scranton, Pa., people, L. H. Hollister and W. W. Watson being largely interested.

South of the Tip Top, on the south fissure, is the Golden Star mine and mill, in charge of H. J. Allen. Here the incline shaft, following the dip of the vein, sinks 550 feet, a level on the vein being run from 100-foot stations. On the first level is 300 feet of drifting, there being 800 feet on the second, 700 feet on the third, with work progressing on the fourth. The work on the fifth has just commenced in ore. This mine makes a good supply of water, the pumps handling 50,000 gallons per day, which is used in mill work. The ores are an iron pyrite, in a white quartz, carrying about $10 gold, that mills about 40% free. The mill has ten stamps, with plates and concentrators. The concentrates carry about 15% iron and 2% silica. They are milling twenty-five to thirty-five tons per day.

The Black Cinder mine, in charge of Jas. A. Doniphan, has been confined merely to development work. The shaft is now to a depth of 500 feet. A drift on the 400-foot level discloses two lenses of ore 80 feet long, consisting mainly of a ferruginous quartz, carrying gold, silver and copper. The ores on the 250 level were largely silver. At the 500-foot level a well-oxidized ore was found, which carried with the gold values about 25% lead and a little native copper. The Black Cinder pumps handle about 50,000 gallons of water per twenty-four hours.

The Idaho Recovery Co., whose work here is in charge of H. R. Case, is just finishing up cyanide work on old Camas No. 2 mill dump, and will now move the plant southward to another similar dump, where there are about 7000 tons of material. They will leach that at the rate of about seventy tons per day. The material will run $3 gold and $1 silver to the ton. Mr. Case figures on making an extraction of about 80%. The work here is rather difficult, as the material contains considerable iron, antimony and copper; but, having laid exposed for years, an oxidization has taken place, forming a sulphate of these elements, which are largely eliminated or neutralized by application of a wash water prior to cyanide work. As the acids are constantly forming during the treatment, a neutralizing agent is added in the tanks. About one pound of cyanide is used here to one ton of material.

The Jumbo group is in the same gold belt, but is 3 or 4 miles west of the Tip Top mine. The Jumbo belongs to the Idaho Milling Co., whose stockholders are mainly Burlington, Vt., people, D. Mackenzie being manager. The vein here stands between a porphyry hanging and a granite foot wall, and will doubtless average 40 feet in width. Much of the ledge matter is composed of a white quartz, granite and decomposed talc, carrying pay streaks of quartz, bearing free gold, with iron and lead sulphide. It is said the values will run about $10 gold and three to four ounces silver. A 10-stamp mill has just been finished, having amalgamating plates and Hallet tables. The mine has been opened through four tunnels, each of which cut to the vein; on the latter there are nearly 400 feet of drifting and upraising. The levels are all connected, excepting the third and fourth. Water is delivered at the mill through a 700-foot flume.

The Junction group, belonging to W. T. Riley and others of Hailey, lies west of the Hattie. It is opened through an 80-foot shaft, on the vein, and a 200-foot crosscut that cuts through ledge showing 15 feet width of ore that runs $10 to $12 per ton. A second crosscut has been driven to cut the vein 300 feet below the upper tunnel, where a similar width of ore is shown that runs $15 per ton.

The Liberal and Maggie May group, 25 miles west from Hailey, is being opened by drifts on the vein. This is at a high altitude, near the east of the range. It belongs to Maj. Reed and others of Boise. The ore is quite free-milling and is said to be of excellent grade.

The Crœsus, only 4 miles west of Hailey, has been closed down a number of months, pending negotiations for a sale. Manager Page is expected to return from the East soon and resume operations.

The ore shipments from Hailey comprise mainly high-grade lead-silver ore from the lead belt and concentrates from the gold belt.

A projected enterprise of much interest to this locality is an electric power plant at Hailey, where the Wood river furnishes ample volume and fall for water power. If the mines of the gold belt prove as good as anticipated, electric power could be transmitted to the mines and mills in that section to the great advantage of their operators.

Hailey, May 31. WASCOTT.

* See illustration, front page.

The Utilization of Tin Clippings and Tin Scrap.*

When first I turned my attention to the subject, I found that large quantities of tin scrap and galvanized iron were every day carted to the dumps.

I found that the average coating on scrap tin, as tin on tin plate, was 3%; that the iron, if properly cleaned, could be used in the nobbling furnace and in the puddling furnace; that the use of galvanized iron was a necessary part of the process; and it looked so encouraging that we decided to build a plant to work it on a commercial scale.

I procured a half dozen of the larger beer casks used for storage, and which are about 6 feet in diameter and 6 feet deep. After removing the heads, they were placed in the ground in a semicircle and a crane was rigged up that commanded all the tanks.

In the first tank was charged hydrochloric acid; in the second, water; in the third, water with a little lime; in the fourth, water; and in the fifth, a solution of copper sulphate.

The plan of work was to fill a large wooden cage that would hold loosely about 200 pounds of the clippings. This was swung on the crane and placed in No. 1 tank. In ten minutes' time the crane was raised and the clippings examined to see if the tin was dissolved. If so, the cage was then lifted out of the acid tank and another cage filled with clippings took its place. The cleaned scrap was washed in the water tank No. 2, lifted up and down to well wash it, and then immersed in the lime tank, No. 3. This neutralized all the residual acid that was left in the pores of the iron. The untinned and limed scrap was then moved to water tank No. 4 for a final washing, then plunged for a moment, just enough to submerge it, in the copper sulphate solution, then immediately removed. The object of this treatment was to form an exceedingly thin film on the iron, to prevent the rusting of the clean iron, which is so sensitive when exposed to the air that it will almost immediately cover itself with rust. The cleaned scrap was compressed in a drop press into balls, and in this form was shipped to the iron works and worked into blooms for sheets, commanding a price of from $10 to $12 per ton.

After the process had been continued for some time, all the acid in No. 1 tank would become neutralized and we would have a solution of chloride of tin.

The process of tin cleaning stopped here for a while. We then took a cage of galvanized iron scraps, filling the cage loosely. When the zinc came in contact with the tin solution, the metallic zinc took the place of the tin, forming zinc chloride, and all the zinc was precipitated as metallic tin, in a finely divided state. We worked this plant successfully for some time, recovering, when melted into ignots, about 600 pounds of tin from ten tons of scrap. The recovered iron commanded $10 per ton and the zinc chloride $20 per barrel, for disinfectant purposes and for treating wood to make it fireproof.

We finally closed the works because of the objectionable vapors that annoyed our neighbors, with the intention of rebuilding on the swamps near Chester; but other things prevented us doing so. I yet think it is the best and most profitable means of utilizing this scrap, especially if electricity is used for the disposition of the tin.

[The salmon canneries and the fruit packing canneries of the Pacific Coast using annually enormous amounts of tin plate, accumulate enormous amounts of clippings, which, in many observations of the writer, are simply thrown away and wasted. The suggestion of the above is particularly worth considering in relation to the economic disposition of the scrap. The tin in bars reduced from this waste would have an immediate market at from 25 to 30 cents a pound, and even the scrap iron is salable at about $10 a ton. There is an opening for profit in the reclamation of this waste that should not be overlooked any longer.—ED.]

* Joseph Richards, in Journal of Franklin Institute.

The Caliche of Southern Arizona.*

In southern Arizona and in Mexico the word caliche is in general use to denote a calcareous formation of considerable thickness and volume found a few inches, or a few feet, beneath the surface soil, upon the broad, dry, gravelly plains and mesas.

In western South America the same name is applied to the beds of crude soda-niter (Chili saltpeter). While these deposits of South America and of Arizona are totally different in composition, and have nothing in common, except that both occur in layers in the strata near the surface, it is probable that an explanation of the origin of the calcareous beds may equally apply to the accumulation of soda-niter and other deposits of easily soluble minerals. But the name, taken from the Latin, Calx, is more appropriate to the calcareous beds than to those of niter.

Caliche has a wide distribution in the arid regions of Arizona and Mexico. It is usually hidden from view by a slight covering of soil; but it is easily found by digging, and is often revealed by a flow of water during heavy rains. It is practically a continuous sheet, from 3 to 15 feet thick, of earthy limestone or travertine, through which the smaller plant roots find their way with difficulty. The presence of this comparatively impervious layer of cemented earth may account for the absence of trees, or of the larger shrubs, over wide areas. The shrubs which gain a foothold are those whose roots do not extend far downwards, and which do not require much water, such as Larrea Mexicana and the Cactacea. If trees are planted it is necessary to break up the caliche by blasting, or at least to crack the upper layers. The top of the caliche is more dense and solid than the lower portions. The surface of this top crust, or layer, is comparatively smooth, though undulating, while the lower portions, under the crust, are irregular, cavernous, earthy and very porous, blending gradually with the materials of the sandy and gravelly beds, from which they are divided by no sharply defined plane of stratification or separation. The caliche invests, surrounds and includes sand-grains, gravel, and more or less earthy material, but seems to have had the power, especially in its upper crust, of extruding the coarse materials of the soil to a great extent.

The deposit does not form a regular horizontal bed conformable with the rude stratification of the gravels and sands, but conforms roughly with the general surface, rising and falling with the undulations of the mesa. There are, in places, repetitions of the compact layers, separated by a few inches of the amorphous and more earthy deposit.

In cross-fracture, this upper crust of the caliche exhibits distinct, fine lines of successive layers, in thin sheets, along which the rock splits with some ease, while there is a rude columnar fibrous structure transverse to these layers, sometimes in divergent lines from below upward. Close observation detects in some places small perforations, like pin holes at the top, which enlarge gradually below and penetrate the entire compact crust, becoming lost in the irregular amorphous granular mass. These holes are often occupied by rootlets of plants; but this is not regarded as evidence of any connection between the deposition of the caliche and plant life—a cause of deposition to which great importance is attached by some authorities. The caliche is an example of deposition independently of the influence of organic agencies.

In chemical composition the caliche is essentially a lime carbonate, but contains some calcium, magnesium and aluminum silicates, as more fully shown by the result of an analysis made by my assistant, J. S. Mann, in the laboratory of the Arizona School of Mines:

Calcium carbonate ($CaCO_3$)	78.28
Magnesium carbonate ($MgCO_3$)	2.13
Calcium silicate ($CaSiO_3$)	5.57
Aluminum silicate ($AlSiO_5$)	7.37
Ferric oxide (Fe_2O_3)	1.88
Moisture (H_2O)	1.20
	96.43

This caliche, unlike the deposits of travertine formed in the open air, is not sufficiently compact and solid to be useful in construction, as was the travertine of ancient Rome. When calcined, it yields good caustic lime, which, tempered with sand, makes a strong, quick-setting mortar or cement. It is quarried and used for this purpose in some places. Occurring, as it does, in mixture with gravel and sand, it has the appearance of an artificial mixture, and as such was once supposed to have been laid down as a foundation by the builders of the Casa Grande in Arizona. On the line of the Phœnix & Prescott railway, it has been found that railway ties last longer when laid in the caliche than in ordinary soil. Analysis of this caliche showed that it did not differ essentially from the caliche of other places.

The great plain or mesa of Tucson affords one of the best examples of the occurrence of the caliche. This mesa, which appears like a great plain, is in reality a combination of gentle slopes from the surrounding mountains. The area within which the phenomena of the caliche are shown is probably not less than 400 square miles, and lies between the Santa Catalina mountains on the north, the Rincon and Rillito mountains and the Santa Rita ranges on the east, and the Tucson mountains on the west. Toward the south and northwest the country is open in the direction of the valley of the Santa Cruz. The Santa Cruz and the Rillito are the visible channels of drainage; but there is, in addition, an extensive underground flow of water as widely spread, possibly, as the area mentioned, but probably strongest in volume under and near the river channels draining to the northwest. The general altitude of the mesa above the sea is from 2400 feet at Tucson to 3000 or 3400 feet about 20 miles eastward. These declining slopes are formed, for the greater part, of the debris of the surrounding granitic and gneissic mountains—the "wash" or gravel and sand which has been washed out from the canyons through ages of erosion. As a rule, these materials are rudely stratified, the coarsest, heavier gravels lying nearest to the mouths of the canyons. In a well 90 feet deep, near the University, on the mesa about 5 miles from the channel of the Rillito, the following beds were passed through, but the strata were not sharply defined:

SECTION OF THE MESA, TO WATER LEVEL.

	Feet.
Soil, sandy and porous	1
Caliche	6
Sand and gravel	12
Argillaceous earth (red)	2
Sand (red)	2
Caliche, soft and amorphous	2
Sand, hard	6
Sand and gravel ("cemented")	3
Sand cemented and aggregated in lumps	11
Argillaceous earth (red)	3
Argillaceous earth and sand (red)	30
Sand and boulders mixed	8
Water in sandy bed	4

Most of the sand and gravel not enveloped in caliche was found well filled with small sparkling crystals of calcspar, which appears to be the cementing substance holding the grains of sand together.

Wherever these gravels have been pierced by wells in the vicinity of Tucson, an abundance of water has been found at a depth of from 80 to 90 feet, or even less, depending upon the altitude of the surface. This water seems to be inexhaustible; at least it is in such quantity, and flows so freely, that the pumping plant at the University can be run continuously, discharging a 6-inch stream, without exhausting the supply in the well.

The general composition of this underground water is shown in the annexed table, compiled from the records of the chemical laboratory of the University of Arizona.

ANALYSES OF WELL WATERS OF TUCSON AND VICINITY—PARTS PER 100,000.

	Two Miles N. of University	R. R. Well	Irrigating Well	Tucson City Water	Hoff's Well	Oracle	Tucson Water Works.
Total Soluble Salt	24.5	42.0	26.0	65.0	45.0	39.0	42.8
NaCl	1.4	3.0	3.0	4.4	4.5	3.4	3.95
$(Na, K)So_4$	3.1	15.2	6.5	26.8	13.3	10.6	16 92
Na_2Co_3	2.0	1.3	1.0	1.8	1.5	2.0	.....
$(Ca, Mg)\ Co_3$	9.0	15.5	9.5	22.0	16.5	14.5	18.56
$CaSo_4$	1.0	trce	0.5	0.0	0.5	0.5	1.74
SiO_2	3.0	2.0	2.0	2.0	2.0	2.0	3.10

It is probable that, in the course of the underground flow of the water from the higher levels towards the Santa Cruz, there are considerable areas of basin-shaped depressions in the bedrocks, where water accumulates and is more sluggish in its movement. So, also, there may be ancient channels, determining a more rapid flow than in other places; in each case there may be a difference in the amounts of solid matters held in solution.

There has been much speculation in regard to the origin of the caliche. It has been generally assumed to be a deposition from some ancient lake, or body of water, once covering the area in which it is found. But such a theory is untenable when all the phenomena are considered. The formation is clearly the result of the upward capillary flow of calcareous water, induced by constant and rapid evaporation at the surface in a comparatively rainless region.

With a constant supply of phreatic calcareous water, the second great essential force in the formation of caliche is the continued desiccating atmosphere—a condition which prevails, with only short and temporary exceptions, throughout the year. The desert and semi-desert regions of Arizona are characterized meteorologically by the unusual dryness of the air and its capacity for the absorption of moisture, and the maintenance of continued evaporation from the soil, which determines a constant upward movement of the phreatic water. The occasional rains in midsummer and midwinter do not penetrate to great depths, but are sufficient to leach out the soil to the depth of a few inches or feet, turning the calcareous solution back and downwards, and producing the denser upper crust, where it meets the upward flow.

Such I conceive to be the origin of the caliche. It may be called a subterranean deposit of travertine; but it is not the result of a flow from springs, or from any source at the surface, or by the lateral movement of water. Unlike ordinary travertine, it is the result, not of descending, but of ascending currents. The ordinary conditions of vadose circulation are reversed. The caliche is a fine example of the formation of extensive calcareous strata in the midst of pre-existent beds, not by metasomatic processes, but by precipitation from sources below.

This explanation may apply equally well to some other subterranean deposits in arid regions, where the upward flow is maintained in excess of any downward percolation. It may apply, possibly, to the origin of soda niter, of some beds of gypsum, and of some of the metallic sulphides. In fact, the phenomena of deposition of ores in mineral veins are here repeated in kind, though not in form, over broad and approximately horizontal areas, so as to make bedded deposits, instead of fillings of fissures.

Surface deposits of soluble salts, such as the chlorides, sulphates and carbonates of the alkalies, are familiar to all residents of the arid regions. The "black alkali" of the Salt River valley in Arizona, so injurious to vegetation, is an example of the concentration, by evaporation at the surface, of solutions of carbonate of soda. The white efflorescences on the soil in the dry seasons, known to the Mexicans as tequisquita, are familiar examples. These deposits become snow white in a dry time and quickly disappear into the soil during a rain storm.

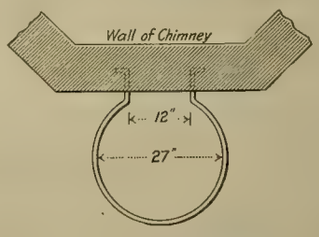
The presence of caliche in the soil over extended areas in the arid regions I regard as good evidence of the existence of subterranean water. The possibility of a change of conditions since the deposit of the caliche should, however, be considered.

I have elsewhere directed attention to the possible enrichment of the upper portions or croppings of mineral veins by the upward flow of solutions formed by the decomposition of the ores above the permanent water level in arid regions, and, conversely, the impoverishment of the croppings of lodes in regions of abundant precipitation, where downward circulation predominates. The copper deposits at Ducktown, Tenn., afford striking illustrations of the latter process.

* W. P. Blake, F. G. S., in Proc. Am. Inst. Min Eng., Feb., 1901.

A Safe Ladder for Chimneys, Stand Pipes or Other High Structures.

A ladder of a new design was recently noticed on a factory stack in Germany by an American engineer, W. B. Cogswell of Syracuse, N. Y. It is a particularly advantageous construction for some purposes and an improvement on the usual style employed. The rungs of this ladder are made as shown in the accompany sketch. The idea is that a man climbing to the top of this stack gets inside of these rungs,



New Form of Stack Ladder.

where he is much more secure than upon the ordinary ladder, as he cannot be blown off, and feels much more safe than when he is outside, besides which he can at any time rest himself completely by standing with both feet and his elbows upon the rungs of the ladder at the same time, or if he likes can have a piece of plank 30 inches long with him, which he can put across one of the rungs and stand upon, thus making himself perfectly secure while working. It is Mr. Cogswell's belief, and we agree with him, that all chimney ladders should be made in this way.

While the cut shows the ladder applied to a brick chimney, there is no reason why similar ladders should not be applied to steel plate chimneys, water works stand pipes, or any other lofty structures to which ladders are attached.—The American Machinist.

A GERMAN PATENT has recently been issued to Dr. Heraeus for a process of producing a platinum coating on porcelain. The surface of the biscuit is coated with the preparation of platinum salts described in the patent, and then heated to a sufficiently high temperature to fuse the coating. The surface thus becomes covered with a conducting covering of platinum, which is very durable and much less expensive than the thinnest sheet. This is stated to be economically adapted for the manufacture of resistances, as the film can be made continuous for considerable length and yet of high resistance and great durability.

A Problem of the Apex.

TO THE EDITOR:—A mining claim (Colorado) is located with its lode line and lode passing through the end lines, as shown in the diagram. Some time afterward the claim (Azure) is located with its lode line and lode passing through the end line also, as shown in the diagram. Third in point of time is the location (Verde) with a vein or lode belonging to it (A—B) passing through the side line of the Colorado at the point B, 150 feet from the corner, and passing through the end line of the Colorado at C, 100 feet from the same corner. The lode dip is toward and under the Verde. The question is, can the Colorado follow the dip of this vein beyond its side line under the Verde? H. S.

Mohave, Cal., May 31, 1901.

The courts have made two different constructions of the law where the apex line of a lode crosses a side line of a claim on an end line. One construction has been that at the point where the apex of the vein intersects the vertical plane of the side line the right of mining in that direction was terminated by the plane of an imaginary end line parallel to the location end lines of the claim, and that the vein within these two planes (the original end line plane crossed, and the end plane of the imaginary end line) carried with it extralateral rights exterior to the other side line. The other construction has been that no extralateral rights attached to a vein so bounded. It would seem, however, that the last construction would produce the greater number of inconsistencies and that the first-stated construction is the conclusive one. Accepting it, the Colorado owns the linear extent of the lode between the points B—C, and the right to mine it extralaterally downward under the Verde between the vertical planes of the parallel end lines C—O and B—S. The Verde owns the apex

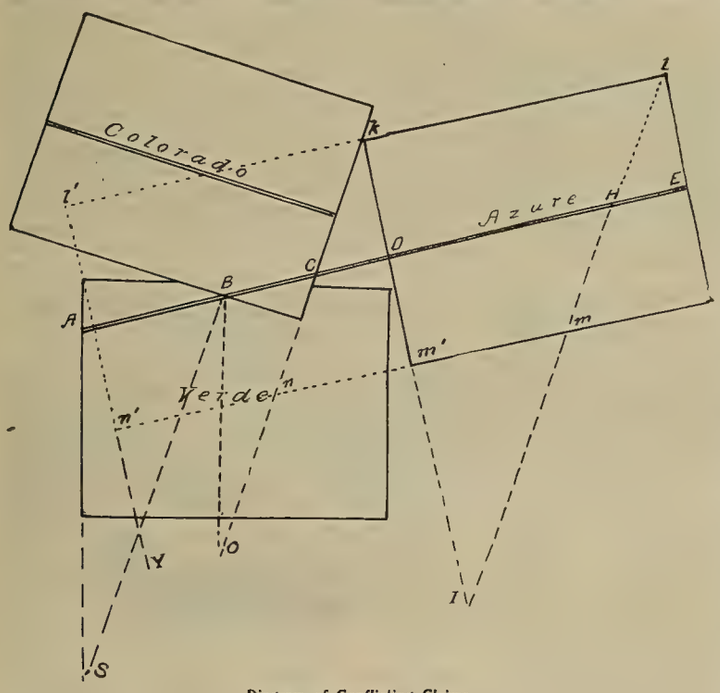


Diagram of Conflicting Claims.

between the points A and B and the right to mine downward extralaterally between the planes of the end line A—S and B—S until they intersect. The Verde, being a later location, has only what has not been previously appropriated. So that, while to technically comply with the law requiring the parallelism of the end lines its terminal boundary would be the imaginary line B—O, the actual end boundary is the imaginary line B—S previously fixed by the older Colorado location.

A question can be raised, it would seem, as to whether or not the Verde is a valid location at all. That is, if there is no lode in it crossing the two end lines of the location. The law has always recognized the validity of location on the presumed general direction of the apex of the lode where it cannot be precisely determined at the time of making the location. But the law does not permit the location of over 300 feet of width on each side of the apex of the lode. The Verde (if the lode A—B be the only lode in it) has nearly 600 feet on one side, where the apex is within its surface lines, and for several hundred feet it has 600 feet width of surface ground without any lode at all from which to initiate the claim. Patent, of course, vests title in fee, so that if the Verde were once patented the question could not be raised. But, being a location merely, it is a grant dependent on compliance with conditions, one of which is the limit of appropriation of side ground. If the locator finds as a fact that he has not complied with this condition, is he not legally bound to make compliance with it by amending his location by changing his side lines so as to take no more than 300 feet on each side of actual lode that is open to appropriation? In making this correction the amended relocation must, of course, conform to rights that have intervened. Failing to make such amendment, the lode would seem to be open to appropriation without reference to the existing claim. Ignorance of a law cannot defeat its operation. Ignorance of the facts should not defeat its operation to the injury of individuals. If such a location as the Verde is a valid appropriation of the surface over 300 feet from the located lode, it carries with it the right to other lodes that may exist in that surface over 300 feet distant. This is not the intent of the law, and it is reasonably to be presumed that such lodes are subject to appropriation exactly as if the erroneous surface claim did not exist. If a locator measures over 1500 feet in his location the excess is locatable. Therefore, if he locates over 300 feet away from his lode, the excess would seem to be locatable. Expressed in another way, the law will not make an unlawful act committed by ignorance lawful, and thus permit by indirection what it would not permit directly.

Referring again to the diagram, the section of the lode between the points C and D is open to location, and would give to the locator the ledge followed downward between the planes of the lines C—O and D—I. Thus there would be, with only a few feet of apex appropriatable, a widening sheet of lode as it extended downward till a maximum length of 1500 feet was reached. The location on the ground to get this extent would have to be staked to conform to the parallelograms k—l—m—n or k—l'—m'—n'.

Nome District, Alaska.

Special Correspondence of MINING AND SCIENTIFIC PRESS.

The opening of the warm season in Nome is fully a month earlier than in 1899. Actual mining will not begin before July 1st in Koogerock and Port Clarence districts, and about August 1st in Far Haven and Arctic districts. In Council City and Top Rock districts a little earlier, June 20th. Much is expected of these last two districts, as there are many good dumps now out and ready for washing.

Nome district has done fairly well considering the extreme cold winter. There are many good dumps out on the benches and washing will likely commence about June 1st to June 10th. Nome is considered the tropic of northwestern Alaska and no doubt the warmest spot along the coast of the whole Seward peninsula. Yet oranges will not do well here until the sun takes a notion to come north to winter.

There has been quite a good deal of talk and several stampedes to the Arctic district and big pay reported to have been found, but any one at all familiar with the Arctic winter knows how utterly impossible it is to prospect in that country during winter. Just imagine 40° to 50° below zero, wind blowing 20 to 40 miles an hour, you hanging onto your sled for dear life, your dog team flying around in the air like a string of toy balloons at a circus, and eating frozen fish and frozen grub!

We are told by the few that have mushed in here over the ice this spring that we shall have another big emigration from the States this summer. It is needless to say that there will be many disappointments, as usual. This is not a poor man's country by any means; it requires capital and large experience and plenty of nerve to back it. There are many fortunes to be made here in the next few years by the capitalists who have the experience and nerve.

We are all anxiously waiting the first appearance of that long black streak on the horizon far out in Behring sea that will bring us the first newspapers from the outer world for more than seven months—think of it! Our mail facilities are somewhat of a farce, and it seems to us here that Uncle Sam ought to be able to carry his own mail instead of farming it out to the English contractors to carry it away round by way of Dawson. There are many bags of letter mail lost here during the winter through the ice—sixteen bags at one time and six at another that we know of, and how many more we will likely never know. It is often reported by mushers over the trail that they pass the mail sleds at the road houses where they have laid up for days and days at a time, while thousands of people were waiting for their letters along this Seward peninsula.

When you receive this, please send me your invaluable paper, with a few back numbers, if you have them to spare, that we may catch up a little of the doings of the outside mining world.

Nome, Alaska, May 20. D. H. JACKSON.

Character of Certain Contact Deposits.*

In many schemes of classification and description the term contact deposit has been somewhat loosely applied to all accumulations of useful minerals (other than those of unquestioned sedimentary origin) which are enclosed between two different rocks. As thus used, the term may include deposits of widely differing origin, and, unless qualified, is not in place in a genetic classification. The present paper deals with a special class of contact deposits.

In many geological provinces granular igneous rocks, such as granite, diorite and syenite, have broken through and invaded sedimentary rocks. The molten magna may in part have reached the surface and there solidified with relative rapidity as a lava. The largest masses of it, however, did not reach the surface, but cooled very slowly at considerable depth under great pressure, and eventually consolidated into a rock of granitic texture. Uplifts and extensive erosion may have followed; and at the present day, in many places, thousands of feet of material have been removed, bringing to the surface the intrusive granular rocks and their once deep-seated contacts, with the sedimentaries which they shattered at the time of intrusion. Along these contacts bodies of useful minerals are often found, most commonly where the sedimentary rock is limestone, or, at least, calcareous.

All the world over this group presents certain characteristics, the more essential of which are the following:

FORM.—The deposits generally follow the contact, but are extremely irregular in detail and almost always very bunchy. No regular form has been recognized as governing the form of the ore bodies, which are sometimes lenticular masses.

POSITION.—The minerals generally occur in the limestone or calcareous rock, immediately on the contact, from which they rarely extend more (usually much less) than 100 feet.

CONSTITUENT MINERALS. — The gangue contains garnet, wollastonite, epidote, ilvaite (lievrite), amphibole, pyroxene, zoisite, vesuvianite, quartz and calcite, rarely fluorite and barite. The ore minerals are specularite, magnetite, bornite, chalcopyrite, pyrite, pyrrhotite, and, more rarely, galena and zincblende. The sulphides may carry some gold and silver—usually more of the latter than of the former—but are rarely rich. Tellurides are unknown. The characteristic feature is the association of the oxides of iron with sulphides, a combination practically unknown in fissure veins, and further the presence of various silicates of lime, magnesia and iron. The deposits are thoroughly metasomatic, having been formed by the replacement of limestone; and the filling of open spaces is almost entirely absent. On account of the great solubility of the limestone, well-developed crystals of the gangue minerals are very common.

EXCEPTIONS.—There are some classes of deposits which, though presenting a certain similarity to this type, must be strictly separated from it. Among these are contact deposits between limestone and igneous rocks which carry as metasomatic products (besides galena and zincblende) sericite, dolomite, siderite and quartz, and which, upon close investigation, are usually found to be related to fissures and faults. Further, certain deposits of iron ores, associated with limestone and with garnet-pyroxene-amphibole gangue, but without any apparent close relation to intrusive rocks.

*From paper "The Character and Genesis of Certain Contact Deposits," by Waldemar Lindgren, in Trans. Am. Inst. Mining Engineers, Richmond meeting, February, 1901.

CALCIUM CARBIDE is believed to have future use as an important element in metallurgical processes. Herr F. von Kugelgen has described a series of his experiments relating to the use of carbide as a reducing agent. Lead, bismuth, chromium, molybdenum, tungsten, manganese, nickel, sodium, potassium, aluminum and cerium were dealt with in his investigations. In most cases he found that the reduction of the oxide or the chloride to the metallic state was possible. The action of the carbide seemed strongest in the case of the chlorides, and generally when the reduction was started sufficient heat was generated by the chemical action to carry the reaction forward without external heating. With the oxides this phenomenon was not noticed. Reductions made of mixtures of chlorides and oxides gave very favorable results. Carbides of the reduced metals were formed only in those cases when the reduction temperature approached that required for carbide formation, and metals more free from carbide impurities may be obtained by the new method of reduction than from the old method of using carbon itself. By using only the amount of carbide called for by chemical theory an excess of calcium in the product was avoided. For blow-pipe reductions in laboratory work it is believed that carbide will prove very useful. The author states that in metallurgical work, under ordinary conditions, 202 kilogrammes (442 pounds) will yield 1000 kilogrammes (2204 pounds) of copper, and other metals in equivalent proportions. Economical reduction of copper ore by

carbide is not feasible at present, but the author believes that for producing nickel and bismuth the method should prove practicable. By using a mixture of the oxide and chloride of two metals it is possible in one operation to obtain an alloy by this means which might otherwise be very difficult to procure.

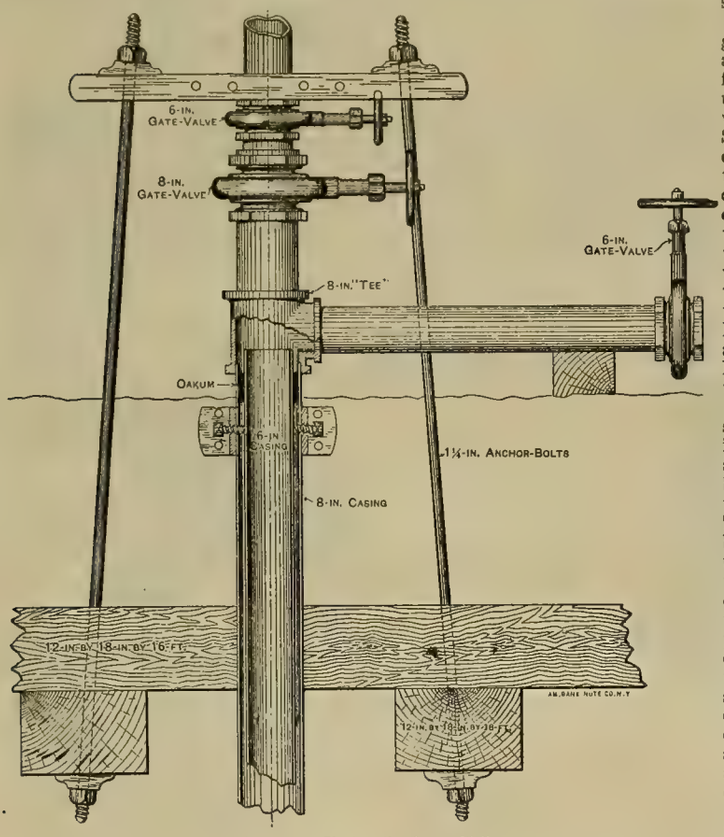
The Great Oil Well Near Beaumont, Texas.*

BY ANTHONY F. LUCAS, BEAUMONT, TEXAS.

THE HISTORY OF THE WELL.—Certain geological indications at Glady's station, 4 miles south of Beaumont, on the Sabine and East Texas railway (a branch of the Southern Pacific) induced me to undertake a thorough test of that locality by means of a well. I had been making reconnoissances for nearly two years in that part of Texas, before deciding upon this supreme effort.

Three previous attempts had been made in the same place: one in 1894 by Messrs. Sharp & Co.; one in 1896 by Mr. J. Looney; and one in 1898 by Messrs. Savage Bros. They had all failed to pass through the immense thickness (500 feet) of quicksand which underlies the surface soil, clay, etc. At first, I employed the system of boring which I had previously used in the Louisiana salt deposits. But I soon found that this method was inadequate, without modification, to deal with the quicksand. According I adopted the use of large and heavy castings, and pipes of 12, 10, 8, 6 and 4 inches diameter, successively telescoped one into the other. Boring was begun by Messrs. Hamill Bros. of Corsicana, contractors, about the middle of October, 1900; and on January 10, 1901, after many difficulties, a layer of rock containing marine shells was reached, at the depth of 1160 feet. For 150 feet immediately above, the drill had passed through layers of sandstone and concretions of limestone. At this time there was about 600 feet of 4-inch pipe, weighing at least six tons, in the well; and this, together with the next (6-inch) casing above, was filled with water. When the rock was penetrated the well "blew out," lifting the whole of the 4-inch pipe. Mr. Hamill was on the top of the 60-foot derrick when the pipe began to move; but the beginning was so gradual that, warned by the outflow of the water, he had ample time to climb down and retire to a safe distance before the pipe was shot into the air. It went to a height of 300 feet above the derrick, the upper works and heavy tackle of which it carried away; then twisted and bent by the strong wind which was blowing at the time, it broke off with a crash and fell to the ground, fortunately injuring no one. The remaining 4-inch pipe, freed from the weight of the upper portion, followed with greater rapidity, and was shot through the top of the derrick. Simultaneously, the water which filled the well (being used to keep the pipe lining clear by removing upward the debris of drilling) was expelled to a great height; and a column of gas, rock fragments and oil followed it, at first at the rate of about 250 barrels per hour, rapidly increased to 500, 1000 barrels, etc., until on the third day the discharge (by that time carrying no solid matter and a diminished quantity of gas) was estimated by officials and engineers of the Standard Oil Co., who were naturally the most experienced judges, to be at least 3000 42-gallon barrels of oil per hour, or about 75,000 barrels in twenty-four hours. Probably I had been too conservative in my previous estimates. Fig. 1 is from a photograph taken at this period.

THE CONTROL OF THE WELL.—Since this unprecedented outbreak took us by surprise, it was necessary to improvise some means of preventing the total waste of the oil ejected, and at the same time to devise a method for getting the stream under control. To attain the first object, we hastily constructed dams or levees to surround the oil. The first one, about 2.5 feet high, was overflowed in twenty-four hours; a second and a third, embracing larger and larger areas, the latter covering about fifty acres, were likewise overflowed. The clay soil seemed to hold the oil fairly well, but the constant danger of fire was a source of great anxiety, by reason not only of the direct loss of oil, but also of the incidental damage which it might occasion; and, above all, because the ignition of the spouting column itself would make it difficult or impossible to recover and control the well. Even more important, therefore, than the immediate saving of the oil was the shutting of the well. Operations for both purposes were carried on simultaneously.



Apparatus Closing the Lucas Well.

I was flooded with telegrams, letters and personal applications by the hundred from parties proposing to undertake the closing of the well — for large rewards. Some of them required cash down (ranging from $30,000 to $100,000); some would not divulge their proposed methods until paid; others submitted their plans; most of them were cranks, but a few had very sensible ideas. I decided to give the first opportunity to my contractors, Messrs. Hamill Bros., subject to my approval of their plan, which I gave, after suggesting certain modifications.

The apparatus used consisted of a carriage, anchoring an 8-inch gate-valve against upward movement; below the valve a short nipple, with an 8-inch tee attached. The whole apparatus was to be launched against the column of solid oil. This constituted the critical part of the operation. But, since the oil was spouting through a 6-inch pipe, and my main outside casing was 8 inches in diameter, the new 8-inch valve, if successfully placed over and connected with the 8-inch well casing, would permit the stream to go on flowing, with an enlarged diameter (or, in other words, with 1 inch "play" all around it), so that the flow would not be checked by this part of the operation. The result answered our hopes. Notwithstanding the violent impact of the oil column, the carriage was successfully placed over the well, and the valve, etc., were drawn down with the aid of bolts until the tee could be screwed into the 8-inch casing.

When this had been accomplished the oil was freely flowing through the open 8-inch gate valve. We then inserted into the tee outlet a piece of 6-inch horizontal pipe, with a 6-inch gate at the end; and, after bracing the 8-inch valve as firmly as possible, we gradually closed it, diverting the stream into a horizontal direction, and carrying it out of way. This gave us opportunity to dig around the well, beneath the derrick, and place foundations for an anchorage, which would effectively hold down not only the valves, etc., but also the casings.

After this we packed oakum tightly between the 8-inch and the 6-inch casing; placed a heavy wrought-iron clamp around the former, and by means of strong set-screws secured the 6-inch pipe against any possible upward movement. Finally, by closing the 6-inch gate value on the horizontal pipe, the flow of oil was entirely cut off. This was done January 19th, at 11.10 A. M., nearly nine days after the well began to flow. The pressure, after shutting down, as determined by a gauge connected with the tee, was 104 pounds per square inch—considerably less than had been inferred from the violence of the stream.

Fig. 2 shows the apparatus as fitted to the well at the moment of the shut-down.

For further protection against fire, a large iron cylinder was constructed to contain the valves, tee, etc., above ground, with a surrounding packing of sand, so that a conflagration in the oil pools may not be communicated to the well.

There was naturally some doubt whether the well would respond promptly when reopened after a period of complete closure. To test this point, the well was reopened about six weeks after the operation above described. Some gas was discharged at first; but the solid stream of oil was immediately restored.

* Trans. Am. Inst. Min. Eng., Richmond meeting, Feb., 1901.

A Petroleum District in Colorado and Utah.

TO THE EDITOR:—This district was first located in 1888 by cattlemen who discovered the existence of the heavier parts of the oil in the form of gilsonite which exists in veins cutting the formation from the surface down to the oil shale (or their origin), and running cross country, some of them for a distance of 15 miles, and with a thickness of from 2 feet to 30 feet of clear mineral.

It was next discovered in 1889 in the form of oil sand, which is saturated with oil for 100 feet in thickness, rich enough so that two parts of pure sand are mixed with one of surface oil sand in making very tough pavements (there being about 2 miles of this pavement now in use at Vernal City, Utah); and also in the form of oil shale, which is about 600 feet thick. Attention of range riders was drawn to this material by building a campfire at the foot of a ledge on White river, which put the entire ledge in flames. On closer examination the river at that point is found to be carrying considerable oil on its waters, but no estimate can be made as to the amount of seepage without quite extensive preparations. In 1890 oil was found on a ranch near Vernal in sinking a well, and the oil spoiled the water for culinary purposes. In 1892 oil was struck in the center of Vernal City in driving for artesian water at a depth of 800 feet in a shale belt which was not penetrated, the well stopping at a depth of 965 feet.

It was next discovered in January, 1899, by J. Popp, J. C. Hainline and J. Tejillo, in the form of lubricating oil, flowing naturally from the oil sand, and this flow is now called the Dewey Oil Spring. The crude oil as it comes from the spring is being used by all the ranchmen in that vicinity, and some of it of late by the R. G. W. R. R. for lubricating purposes. Late in the season of 1900 the debris was stripped from the formation from which the oil flows, exposing quite a large flow, which was plugged until such time as arrangements can be made to utilize it. At present four companies are interested in this development and all of them contemplate boring this season.

This formation belongs to the Mesozoic period. Where it is exposed on the surface it consists of four strata of oil-bearing rock, two of sand, one of limestone and one conglomerate. These oil yielding strata are from 12 to 100 feet thick, varying in different localities, and are capped with light strata of shale, all of which are overlaid with a 600-foot stratum of oil-bearing shale. The seams and holes in this large belt of shale, where it is exposed on the surface, are filled with the heavier parts of the oil, or gilsonite. This oil can be boiled down to first-class gilsonite, and as it seeps from the sand it is depositing gilsonite in four different places that came to my notice. There are no small anticlinals; the formation dips from exposed parts on the east, west, north and south to the center of a basin about 30 miles across; the formation in the center of this basin is about 2000 feet lower than any part of its outcrop, except where it is cut by the Green river in the Rocky mountains, which is about 1500 feet down, or about 500 feet above center of basin. The oil shale in the basin is covered with about 800 feet of sandstone in which the veins of gilsonite occur. Near the shale these veins grow smaller and on reaching it they disappear entirely, leaving the gilsonite in seams and bunches. For a short distance the veins seem to penetrate the shale for a few feet. The oil, as it seeps from the outcrop of the oil-sand beds leaves some of its base mixed with the sand, forming a very tough, hard cement, which holds the oil from escaping from below. R. M. POPE.

Salt Lake City, Utah, June 19.

Slate as Roofing Material.

The value of a roofing material is determined by a variety of considerations, among which the most important are first cost, durability, appearance, resistance to fire and consequent influence on the cost of insurance, and the expense of maintenance and repairs. Below is a table showing a comparative estimate cost of the leading materials used by the roofing trade. This estimate is based on the "square" —100 square feet of surface—laid on the roof in the vicinity of Philadelphia and New York:

Material.	First cost.	Average life in years.	Average cost per year.
Slate	$ 6 00	75	$0 086
Tin	5 50	20	275
Shingles	4 30	12	358
Corrugated Iron	5 10	10	510
Tin Shingles	6 70	10	670
Copper	30 00	30	1 000

It will be readily seen that a slate roof is not only

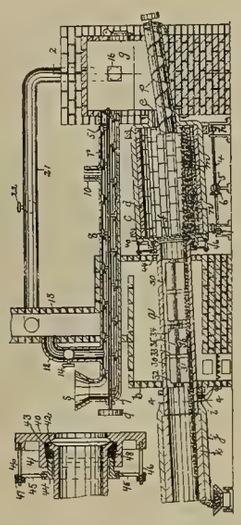
the most durable, but when the original cost and average life are taken into consideration, it is three and a half times cheaper than tin, four and a half times cheaper than shingles, six and a half times cheaper than iron, and twelve times cheaper than copper.—D. McKenna in Cement and Slate.

Mining and Metallurgical Patents.

Patents Issued June 18, 1901.

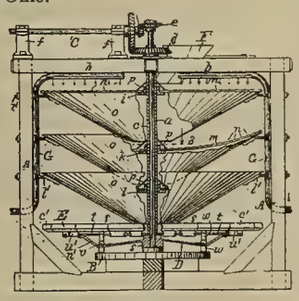
Specially Prepared for the MINING AND SCIENTIFIC PRESS.

APPARATUS FOR ROASTING ORES.—No. 676,417; H. Carmichael, Malden, Mass.



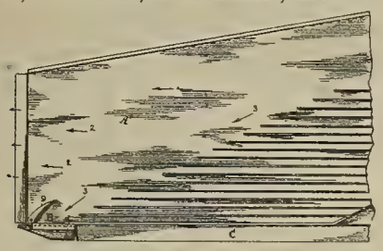
A rotatable combustion chamber, a rotatable retort communicating with combustion chamber, a flexible joint for connecting retort with combustion chamber, means within retort for disseminating ore on passage through retort, means for externally heating retort and combustion chamber, and means for feeding ore successively through combustion chamber and retort.

GOLD SEPARATOR.—No. 676,419; L. L. Carter, Wauseon, Ohio.



A holding frame and a central vertical shaft, a sleeve upon shaft, hubs secured to sleeve provided with radial carrying arms, and screens supported by arms, and a plate in sections controlled by shaft, beneath screens, and means embodying a cam plate and connections for reciprocating plate and means to revolve shaft and sleeve at different rates of speed.

ATTACHMENT FOR CONCENTRATING TABLES.—No. 676,427; W. G. Dodd, San Francisco, Cal.

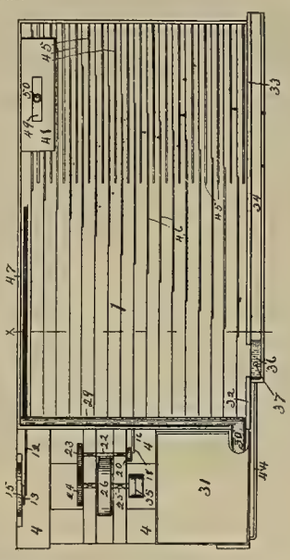


The combination with a reciprocating concentrating table of a horn attachment secured thereto and carried thereby so as to receive and work middlings discharged therefrom, attachment extending from approximately discharge end of lowermost riffle of table to discharge end of table, discharge end of horn attachment being contracted.

PROCESS OF MAKING CARBIDE OF CALCIUM SIMULTANEOUSLY WITH SILICIDE OF IRON.—No. 676,514; W. Rathenau, Berlin, Germany.

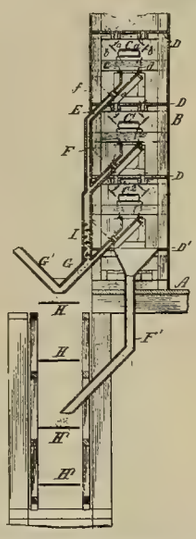
The process of simultaneously producing carbide of calcium and a compound containing silicon, which consists in producing calcium carbide by heat sufficient to cause fusion, from raw material containing carbon calcium and silicon, simultaneously acting upon with an added substance containing a metal having a greater affinity for silicon than calcium has for silicon, and finally removing silicon compound and carbide of calcium from mass separately.

ORE CONCENTRATOR.—No. 676,534; T. Dynan, Amador City, Cal.



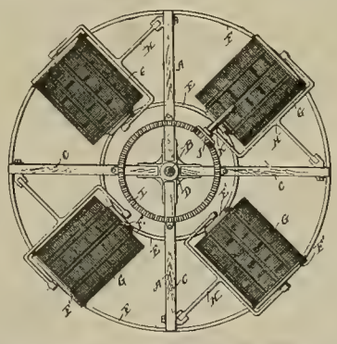
The combination with a suitable table and connections of adjustable rollers 2 arranged under front side of table and journaled in trusses 3, trusses 3 adjustably attached to suitable bed timbers by thumb nuts, rollers 7 arranged beneath rear side of table and journaled in arms 8, arms 8 pivoted to bed timbers and having supporting arms 9 attached thereto, arms 9 each provided with a slot 10 and thumb nut 11, rod 12 attached to arms 8 and to lever 13, and lever 13 provided with its spring stop 14.

MAGNETIC SEPARATOR.—No. 676,618; T. A. Edison, Llewellyn Park, N. J.



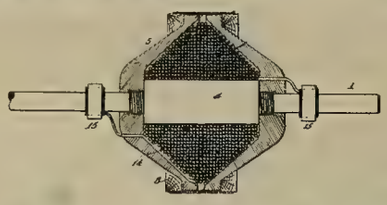
The combination with stack B of magnets C, C′, C² of different strengths, perforated floors D, inclined boards a, b, dividing boards c, d, and inclined conduits E provided with perforated plugs e.

APPARATUS FOR OXIDIZING.—No. 676,647; A. N. Dubois, Philadelphia, Pa.



The combination of a circular trackway, a rotary carrier, perforated drum attached to carrier and provided with wheels to traverse trackway, a drive shaft, a countershaft operatively connected with carrier, fixed sprocket wheels of like diameter on drive shaft, loose sprocket wheels of unequal diameter on countershaft, chains connecting sprocket wheels on two shafts, and a double clutch coacting with loose sprocket wheels.

MAGNETIC SEPARATING APPARATUS.—No. 676,840; T. A. Edison, Llewellyn Park, N. J.

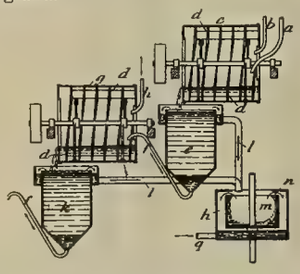


The combination of a magnet having two dished members having polar extremities which are adjacent to each other with a relatively narrow gap between them, non-magnetic rims rigidly carried by said members and arranged parallel with polar extremities, and a belt carried by rims and polar extremities, to which mixed magnetic and non-magnetic materials are fed.

MAGNETIC SEPARATING APPARATUS.—No. 676,841; T. A. Edison, Llewellyn Park, N. J.

The combination with an endless belt supported at both ends and caused at one end to travel concentrically with respect to a magnetic field, linear travel of belt being substantially parallel to zone of maximum magnetic attraction, of means for feeding magnetic and non-magnetic material to belt in an area of line with zone, whereby magnetic particles will be caused to move laterally with respect to non-magnetic particles while latter are subjected to centrifugal force.

PROCESS OF SEPARATING METALLIC FROM ROCKY CONSTITUENTS OF ORES.—No. 676,679; F. E. Elmore, Leeds, England.

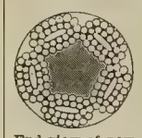


The process of separating the metallic from other constituents of ore, which consists in mixing with crushed ore to which sufficient water has been added to make a flowing mixture a substance other than mercury, to which metallic particles only will adhere, and then recovering metallic particles from such substance.

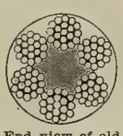
A New Style Wire Cable.

A number of engineers experienced in the use of elevator wire cables examined the cables of elevator No. 1 of the Bank of Commerce Building at St. Louis, Mo., and found that after five and a half years of continual service the inside strands were in as good condition apparently as when made.

The examination was made by the engineers at the invitation of the A. Leschen & Sons' Rope Co., of St. Louis, Mo., who are the manufacturers in America of the patent flattened strand wire rope, and was made in order to determine whether the oval center of the five strands cut the inside wires. The examination proved that the wires were not even indented by the oval cores of the strands.



End view of new style cable.



End view of old style cable.

This rope is an English invention, and the firm secured the sole right of American manufacture. The flattened strand causes all the outside wires to rest evenly on pulleys or wheels, and to the claim that this would give 150% more service than any round strand wires, the life of the cable examined and its condition would seem to give an affirmative answer.

The engineer of the Bank of Commerce Building, discovering that some of the outside strands were broken, ordered a new cable. The American manufacturers took the occasion to put to examination the claim that the patent strand did not cut the inside wires.

MINING SUMMARY.

Specially compiled and reported for the MINING AND SCIENTIFIC PRESS.

ALASKA.

KETCHIKAN.

E. W. von Hasslocker reports Dolomi (Johnson's inlet), Kassan bay and other mining camps as active. Niblack anchorage particularly is looming up with developments of copper ore.

NOME.

The results of the winter's work indicate that Nome can be considered a winter camp. Within a circle of 8 miles about the city $500,000 will be washed out of dumps taken out during the winter. With coal at reasonable prices for thawing, winter work can be prosecuted on a large scale.

From Council City and the Topkuk it is said that the winter dumps will yield $500,000. The Topkuk beach continues to yield good pay. The bankers and commercial agents of Nome have received over $100,000 in winter dust and nuggets.

Reports received at Nome during the winter tend to verify the reports of richness in the Bluestone and Kougarok country, and encouraging reports come from the farther northern Arctic districts.

PORCUPINE.

The miners of Glacier creek are having trouble with the Canadian mounted police over the collecting of duty upon the miners' outfits taken to Glacier creek, which was located under the American mining laws but is now claimed by the Canadians under the modus vivendi. All the creeks are working under full head and the first day's cleanup on the Willey & Finley claim was $800.

SITKA.

The legal difficulties regarding the Stewart mine at Sitka are now disposed of and the property will be developed.

Directly across the bay from the Stewart mine a number of claims have been located. Preparations are being made to put in an air compressor and run a working tunnel which will cut the ledge at great depth. The Chicago & Sitka G. M. Co. controls these claims.

The Lake Mountain, embracing four claims and a 5-stamp mill, is controlled by Providence, R. I., people. It is located about 5 miles from salt water.

The Lucky Chance is 2½ miles from Silver bay. Its ore goes $30 per ton. Two tunnels are being opened and a 7-stamp mill will be erected near tide water this summer. A tramway will connect the mine with the mill.

ARIZONA.

COCHISE COUNTY.

The Gleason Co. have the main shaft down 200 feet, opening a body of sulphides 28 feet wide. Shipments from the mine average 1000 tons per month. The properties are bonded to Eastern parties at $1,000,000 for one year.

GRAHAM COUNTY.

Two gas engines have been put in the pumping plant of the Arizona Copper Co. to pump water from Clifton to the new concentrator.

CALIFORNIA.

AMADOR COUNTY.

E. P. Raun, the owner of the Delray mine at Middle Bar, is running a tunnel prospecting.

The Mitchell mill at Pine Grove is shut down while development work and repairing are being done. The shaft is down 200 feet.

At the Amador Phœnix mine near Clinton the 10-stamp mill is being put up and it is expected to have it in operation in two months.

CALAVERAS COUNTY.

Manager W. C. Ralston of the Melones Co., Robinsons Ferry, states that the 120-stamp mill is to be completed this summer. As to whether water, electricity or steam will be used for power has not been determined as yet. The upraise from the level of the old Carolina tunnel to the old works above on the Carson Flat side of Carson hill has been finished. The mine is now considered in shape to steadily supply 120 stamps with ore.

The Demarest mine is closed down for an indefinite period. The last run of thirty days yielded $2900.

NEVADA COUNTY.

It is reported that the Wright & Bailey mine near Sweetland is soon to be developed. F. Wright of North San Juan says that a San Francisco company is interested. It is said that a smelter will be erected.

The Lecompton mine recently shipped ten tons of ore to the smelter, which returned $600 to the ton. Dunlap & Thomas are working the mine.

PLACER COUNTY.

At the Nisson quartz mine, near Colfax, the new owners are installing a Huntington mill. The ledge is a large vein of soft rock heretofore worked by sluicing.

At the Mayflower mine at Forest Hill J. E. Nihill is Supt. Work has been done to tap the upper Paragon channel.

At the Sacramento mine, near Forest Hill, an upraise of 153 feet was made from the main tunnel some 1200 feet in. Very rich gravel was encountered and preparations are being made to develop it.

At Butcher Ranch H. McKinstry and H. Skinner are prospecting the E. B. Gilbert claim.

Semple & Son of Yankee Jims have commenced to clean up at the Cambridge tailing mine.——J. A. Holmes is taking out good gravel at the Little Dipper mine. ——Chinese are working the Small Hope gravel mine on a lease.——A. McCullom has a lease on the Enos, Federer & Cranage mine.

At the Hidden Treasure at Centerville some time since an east and west channel was cut crossing and cutting off the big white gravel channel at a point about 9000 feet in. The main tunnel extended through cement 200 feet, again entered the white gravel. A shaft was sunk in the 200-foot channel 18 feet, when 3 feet of blue gravel and bedrock was reached. The main tunnel has been extended 550 feet on the white channel beyond the point where it was cut off. A gangway run west 250 feet cut the rim. The gangway east 300 feet is still in good gravel. The present operations are in the four breasts in gangways Nos. 9 and 10 at a point about 8000 feet in, with about a year's work in sight. No. 5 gangway 7000 feet in on the main tunnel has been run west across the channel 1100 feet; then in a northwesterly direction 440 feet to work a body of gravel on that side of the channel which is lower than the main tunnel. The blue channel is being worked through a slope. This channel has been opened north 1000 feet and south 300 feet. An average of 400 cars of pay gravel are taken from the white channel daily and 100 from the blue channel. The Hidden Treasure Gravel M. Co. employs 170 men. H. T. Power is president, F. K. Develey secretary and C. D. Akers Supt.

A ditch is under construction from a reservoir from the South Yuba Water Co. to the Gold Blossom mine at Ophir, a distance of 6400 feet. Pipe has been contracted for to develop the water power at the mine under 440 feet head. F. Hartley has charge of the construction.

PLUMAS COUNTY.

F. C. Dickenson says of the property of the Last Chance M. & M. Co., in eastern Plumas county, that it has a 7-foot ledge containing copper, silver and gold, with ore assaying from $50 to $103 per ton. The company is a Reno, Nev., organization, including J. Sparks, D. C. Wheeler, A. E. Murdock, F. Fry and others.

SAN DIEGO COUNTY.

It is reported that the Golden Cross mines at Hedges, near Yuma, have been sold to New York parties for $2,000,000.

SHASTA COUNTY.

G. H. Barber has a contract to run a lower drift on the Evening Star. Sinking is in progress to connect the lower drift with the surface.

W. D. Watson and C. Watson are working the Connor mines on Salt creek under a bond. The shaft is now down 60 feet. From the bottom of it, drifting north and south, the ore body shows an 18-inch vein. The ore, which they will begin shipping immediately, will go to the smelter at Keswick. It is expected to return them about $3000 as a result of their four months' work.

S. L. Jones, A. C. Hamilton and H. M. Gorman have bought the Kline & Wall mining claims at DeLamar. The claims lie about a mile from the Bully Hill mine. They were located only a few months ago.

SIERRA COUNTY.

The Twin Eagles mine, midway between Downieville and Sierra City, which was operated by Poorman & Hastings, has been abandoned, the rock being too low grade to work at a profit, and the machinery has been sold.

SISKIYOU COUNTY.

A rich vein of ore has been struck in the tunnel of the Highland mine on Russian creek, on the road from Etna to Sawyer's Bar. W. C. Music is the owner. The ledge runs from 2 to 28 inches in width.

Work has been started up again in the Schroeder mine at Deadwood. It is reported that the mine has been sold by the Canadian company who bought it a year ago.

TUOLUMNE COUNTY.

The Mt. Jefferson will be started up by Eastern capitalists soon. Supt. J. Meihan proposes to sink the shaft to a greater depth. A hoist of larger capacity is being erected.

The mill on the Eureka Con., or Dead Horse, mine will not be operated pending sinking the shaft from the 1550 level.

A 2-stamp mill is being erected in Hunter Canyon to work ore from the Blue Bird, owned by J. Gloster.

At the Hunter mine another hundred feet is to be sunk with increased power facilities from the better development of the water power.

The Jamestown G. M. & M. Co., capital $300,000, has been incorporated to operate the Badger, Annie Dwyer and Calker claims, on the west belt of the mother lode near Jamestown. R. S. Enslow is president and J. W. Byrd of San Francisco secretary of the company. The development on the ground consists of a shaft 250 feet deep and levels run from it. The ore is estimated to average about $14 a ton in the shoot.

COLORADO.

The matte smelter which Dr. F. R. Carpenter is now erecting at Golden, it is said, will have a refinery owing to no satisfactory arrangements for refining being made with the existing refineries. Work on the buildings has been commenced. Dr. Carpenter says that the addition to the plant will make the smelter absolutely independent, and in that respect of considerable importance, though it adds but little, comparatively, to the cost of the plant. The smelter will be blown in between the 1st and 15th of July. Ore is already delivered and there will be a good supply on hand when operations commence. Dr. Carpenter has bonded the Stephens group in Clear Creek to insure the plant an ample supply of ore.

The scheme for the erection in Denver of a central refinery for the independent smelters will be revived as soon as the matte plants have completed the enlargements now in progress or projected. With the addition to the Florence plant that smelter will have a capacity of 800 tons per day. The Buena Vista's capacity will be 300 tons, the Golden smelter 300 tons, the Ouray smelter 100 tons, and the Kendrick & Gelder smelter at Silverton 100 tons. Investigations now in progress may result in the construction of a Carpenter matte smelter for the low-grade ores of Boulder county. All of the smelters will therefore have a capacity for treating 1600 tons of ore per day, and the proposition will be submitted to jointly establish a refinery.

The consolidation of Colorado ore reduction works milling Cripple Creek ores has been made as the American Red. & Ref. Co., capital $10,000,000. Tutt, Penrose & MacNeill, of Colorado Springs, are said to control the combination. C. M. MacNeill, it is said, will be general manager. Only the four largest plants are included, the Union G. Ext. Co. and the Metallic Ext. Co. at Florence and the Standard M. & S. Co. at Colorado City. The combined capacity is 1500 tons daily, or 45,000 tons per month. The combine is expected to absolutely control low and medium grade Cripple Creek ores marketed. It is reported that all ore producers having contracts with the old companies have been notified that after July 1st new contracts will be on the basis of rates from $8 to $12 a ton, averaging $1 a ton advance, being precisely the average advance made in smelting charges since the consolidation.

BOULDER COUNTY.

The new machinery for the Colorado & Northern G. M. Co. will be installed for the extension of the tunnel, now 2065 feet in. A strike has been made at the 1330-foot point, which shows considerable silver, galena and copper.

The Lucky Star mine at Boulder has paid for sinking its shaft 300 feet from the returns from ore, and in addition paid dividends to the owners.

The Enterprise, at Eldora, leased and bonded to Mrs. E. J. H. Richardson of Denver, is doing development work. C. Shahan is superintendent. It is equipped with a steam hoist, and the shaft is down 360 feet.

CHAFFEE COUNTY.

D. A. Freman, manager of the Sedalia mine, and the company's engineers are preparing plans for the construction of a milling plant at Sedalia. The company owns the Canon City smelting plant, and heretofore all the ore shipped has been sent to that plant. The details of the new plant have not yet been determined upon finally.

CLEAR CREEK COUNTY.

The Omar G. M. & T. Co. has been organized by J. L. Lindsay, H. A. Riedel and G. L. Torrey, capital $200,000, to operate 130 acres of ground, including the Holland tunnel and tunnel site in Hamlin gulch, near Idaho Springs.

The Idaho Springs G. P. Co. some time since bought the Torpedo and Sky Rocket mines, near Idaho Springs. W. S. Marshall is manager.

GILPIN COUNTY.

The Seneca G. M. & M. Co. of Buffalo, N. Y., has resumed work upon the Brooklyn mine, in Lake district, near Black Hawk.

LAKE COUNTY.

The mining companies operating where streets and alleys are owned by the city and a number of mining men have made bids for leases on the ores beneath the streets and alleys. The Maple Street M. Co., sinking in virgin territory, feel that they will open up the extension of the Leadville basin ore shoots. Their shaft is down over 500 feet, and they are now pushing diamond drill work before sinking deeper. They are now endeavoring to secure the rights on royalties to the mineral under the streets and alleys in the neighborhood of the shaft, and offer to pay royalties on net smelter returns as follows: $10 or less, 10%; $10 to $20, 15%; over $20, 20%.

The development of virgin territory is to be begun by the Holland M. Co., owners of forty-nine acres on Fryer hill. The property was located and patented by J. Healey and A. G. Verhofstead, miners, who leased for five years from their co-owners, Messrs. Kountze, Sheedy and Schlessinger of Denver, and are arranging to develop the property.

SAN JUAN COUNTY.

Ore returning 2.84 ounces gold and 30 ounces silver has been found on Galena mountain, 12,000 feet high, and about 3 miles from Howardsville, by C. A. Marshall.

TELLER COUNTY.

A consolidation, including the Dante, Tenderfoot Hill Con., Robert Burns, Fauntleroy, Golden Terry and Ramona properties, 134 acres on Battle mountain, Raven hill and Tenderfoot hill, is being negotiated, and, it is expected, will be formally effected by the present owners on July 12. It is proposed to incorporate with $3,000,000 capital stock, of which $2,500,000 will be allotted in payment of the property.

The Maggie, on Bull hill, idle for a year, is likely to have work resumed by lessees. The shaft is down about 400 feet, and has on it a good plant of machinery.

Deadwood No. 2, owned by the New Zealand Co., Bull hill, Cripple Creek, is making a good production. The pay streak is from 1 to 3 feet wide. The last shipment ran $22 per ton. Assays taken from an upraise on 18 inches of quartz ran from $200 to $400 per ton.

A Cripple Creek Co. has arranged for the extensive development of Mineral hill. They propose to organize a leasing company and start a system of development that will reach all of the veins known to exist in the hill, and bring the output nearer into Cripple Creek than possible by shaft development.

The Rittenhouse property, 11½ acres on Gold hill, near producing properties, and 50 acres in other parts of Cripple Creek, have been bought by A. O. Crozier of Grand Rapids, Mich., and his associates for, it is stated, $151,000. The Rittenhouse has a shaft down 300 feet, with considerable drifting, and has produced some pay ore. The mine has been operated by the buyers for the past three months.

The Golden Cycle Co., at Cripple Creek, on the 18th inst. lost its shaft house and ore house by fire, and two months will be required to put the mine in a condition to resume production. The fire went down the shaft for some distance, destroying the timbering. The rebuilding of the surface improvements has been commenced, and it is said a $25,000 plant will be built. The machinery, consisting of the hoist and boiler, remained intact, and can be used again.

IDAHO.

IDAHO COUNTY.

W. H. Plummer of Spokane, Wash., president of the Dixie Queen G. M. Co., has bought from S. Dillinger the North Star and South Star claims at Dixie.

The Midas G. M. Co., having explored the Ajax property, is waiting on the construction of a mill, which will be installed as soon as possible.

Two new stamp mills are going into the Buffalo Hump country, is stated by T. Parks, Supt. for the Clarence Ray-Buffalo Hump Co. One of the new mills has been bought by F. Brown for the Jumbo. It is of the latest pattern of a 2-stamp battery and can mill ten tons of ore a day. It is put on chiefly to prospect the property. More machinery will be added later. There is 6 feet of ore that assays $25 per ton. Development has been by a tunnel 350 feet long that enters the lode 250 feet down.

The Wise Boy people, at Buffalo Hump, are getting a mill. Judge Moore, one of the owners, is in San Francisco to buy the machinery of a 5-stamp plant, and it should be on the ground in August. The

Wise Boy has a ledge 18 feet wide, with a 3-foot pay shoot in it that runs very high.

A discovery is reported from the great bend of the Snake river near Ontario. It seems that a shaft has been sunk 85 feet, passing through 4 feet of false bedrock. Beneath is found a conglomerate, as it is described, that carries gold in large quantities. According to the report, the shaft has passed down 25 feet in this material, which becomes richer with depth. It is said the gravel carries $27 per cubic yard. People in the vicinity are staking the ground off rapidly.

KOOTENAI COUNTY.

R. Neill, operating discovery claim in Santa, has been using sluice boxes, taking out about $15 a day to the man.——W. Partridge of Rockford, owner of the Yellow Boy placer claim, is sinking for bedrock.——J. W. Monford is putting in sluices on Tyson creek.——The McClellan Bros. are opening the Pheasant placer claim, on the north side of the creek, and are taking out some fine gold. About twenty placer claims are being worked at present. Some strong high-grade ledges have been discovered. Active development work is now in progress on the following claims: Blue Bird, Morning Star, Asurite, Washington, Spokane, Ironclad, Rabbit's Foot, Pheasant and Little Mac.——Mathews, Shroder and Desgranges are sinking a shaft on the Blue Bird. The ledge is 8 feet wide at the surface and assays $3 gold, $10 silver and 3% copper.——About seventy-five miners attended the meeting at Tyson on the 16th inst., and petitions asking for a postoffice, a daily mail service and a county road were signed.——H. S. Richey has erected a log building which is to serve as store and hotel.

MONTANA.

CHOTEAU COUNTY.

A strike is reported from the Landusky mining district by O. P. Sorbman and G. Putman, who have located an immense lead about 2 miles long and 200 feet wide. The assays show all the way from $8 to $18.

DEER LODGE COUNTY.

In the Snowshoe district, near Elliston, a ledge of copper pyrite has been opened in the Amelia claim by Smith & Castimore.——C. W. Wakeman has a fine showing of copper ore in the Copper Wire claim.——Rawlings & Co. are shipping carbonate copper ore from the First Chance claim, which they have bonded from A. McDonald.——Southmayd & Matchette are sinking a shaft on the Sure Thing and have struck a shoot of ore carrying high values in silver.

FERGUS COUNTY.

The New Year G. M. Co. at New Year has contracted for the construction of a Bleichert wire rope tramway connecting the mines and mill. The distance is 4900 feet, difference of level 564 feet. The capacity will be twenty-five tons per hour. The management estimate that the cost of ore tramming will not exceed 7 cents per ton, the cost by wagon transportation heretofore having been 60 cents per ton.

High-grade ore is shipped from the Spotted Horse mine at Maiden to the East Helena smelter. The value of some of the high-grade ore being shipped is more than $750 per ton, and the average of the first 30-ton shipment it is claimed will exceed $300 per ton. The 20-stamp mill at the mine is being prepared to work the low-grade ores, which average about $12 per ton.

Lewistown, Mont., June 17.

LEWIS AND CLARKE COUNTY.

The erection of two new blast furnaces at its East Helena plant is contemplated by the American S. & R. Co., to work the increased quantity of ore offering for treatment. The erection of an entirely new blast furnace building with a capacity for six furnaces is said to be dependent only on the closing of new ore contracts, which would make the extension necessary. C. W. Whitley, the manager, says the present capacity is 800 tons a day, when all four furnaces are in blast, and the two new furnaces would increase it to 1200 tons a day.

R. A. Punches has made a rich copper strike in his iron mine near Butler. He says: "I struck copper ore a month ago, and it has been getting better ever since. I am now down 100 feet on the incline shaft. At a depth of 60 feet I struck the first copper. The mine has been worked as an iron mine and I have been shipping the ore for flux in the smelter. I have three claims and am working the Red Bird, employing three men and shipping three cars a week.

L. C. Alexander of Kansas City has bonded the Josephine lode and the interests in the Marshal Ney and Gus Nelson claims in the Rimini district, owned by the First National Bank when it became insolvent.

NEVADA.

ESMERALDA COUNTY.

The Mt. Diablo tailings at Soda Springs have been sold to California parties, who are now putting up a plant to work them.

J. F. White and associates, who bought the O'Hale mines from Senator Wasson, will move the State Line mill to the mine near Silver Peak.

HUMBOLDT COUNTY.

The Nevada M. & S. Co. has purchased the Hadley & Campbell group of mines, consisting of the Gold Bug, Fair View, Badger, Unlucky Dog and Carbonate claims, in Buena Vista mining district, near the town of Unionville in this county. Work will be commenced on the property at once. J. C. Hadley will be general manager of the company and J. P. Campbell Supt. of its mines.

Unionville, in the foothills of the Buena Vista mountains, 20 miles south of the Central Pacific R. R., is one of the oldest mining camps in Nevada, having been located in 1860. At one time there were four quartz mills working ore taken from the mines of the district; they were all wet-crushing mills, working to save free-milling values. The ore carrying most of its values in sulphides, a very small percentage of the content was saved. The mines for twenty years have been operated with this free-milling method, but have been unprofitable, particularly since silver decreased in value. There is, however, an enormous quantity of ore that, with modern treatment and machinery, will pay well.

In the vicinity of Unionville, Dunglen district has gold mines which have been worked in a small way for many years. There are large bodies of low-grade gold and lead ores here which could be made to pay with concentrating machinery, using the cheap power of several streams.

Star City district has antimony deposits, as well as gold and silver, all in large bodies, with water power that can be utilized.

Cottonwood canyon is another near-by district, rich in ores that can now be handled cheaply. There has been much development work done here on lead deposits. J. C. H.

Unionville, June 22.

WASHOE COUNTY.

The company formerly the U. M. Slater Co., but now composed of Gen. Turritin, A. Fleisshaker, Senator Flanigan, J. Sullivan, A. Scheline, A. G. Fletcher and A. E. Osborn, have let to M. Shields of Placer county, Cal., the contract to run a tunnel 1000 feet on the First Chance and Lake claims, Wedekind district.

The Empire Copper Co. at Pyramid has started tunnel work. M. D. Young, one of the bonders, is Supt.

The Ballarat M. Co. of Nevada has been incorporated by S. W. Porteous, A. W. Plummer, W. H. Merklinger, J. Merklinger, G. Merklinger, F. M. Baughton, S. Armanko, C. R. McBurney and J. E. Stanaway of Reno, to develop a claim located near Reno. A. W. Plummer was elected secretary and treasurer.

WHITE PINE COUNTY.

Seventeen mining claims in the vicinity of the Ely claims, near White Pine, have been optioned by the wife of President McKinley and her sister to an Eastern syndicate. Prospectors on the Ely claim recently uncovered ore which assayed as high as $140, but a survey showed the deposit to be on the claims and work was stopped. The survey showed that the Los Angeles claim also encroached, and that the 65-foot shaft which that company had been working a number of years was on the Saxton claim.

NEW MEXICO.

GRANT COUNTY.

S. M. Rohr, president of the Pacific Union M. and S. Co., expects soon to begin the erection of a custom smelting plant at Lordsburg, so as to blow in the first stack in September. Later other stacks and a reverberatory furnace will be added. The company have already contracted for 600 tons of ore for daily delivery from Shakspeare and Stein's Pass.

SOCORRO COUNTY.

The directors of the Silver Bar C. M. Co., operating in Cooney district, has declared its first dividend—6 cents a share, $5400 in all—the issued capital stock being 90,000 shares. This company is a close corporation and is owned by C. H. White, D. P. Sill, H. C. McCreery and two others, all of Denver, Colo. H. C. McCreery, superintendent, states that last month the mine earned an 8-cent dividend over and above all expenses out of a total production of only $12,000. The average monthly output is $15,000. The deepest workings are now about 400 feet.

OREGON.

GRANT COUNTY.

The Alamo Co., near Granite, J. R. Cassin of Spokane, Wash., Supt., is pushing work in its long tunnel. About 300 feet of work is required to make connection with old workings. The company is planning to erect a stamp mill.

JACKSON COUNTY.

It is stated that the Treasure mine, at Blue River, bonded by J. Downer to Fisher & Chapman, and rebonded by them to C. H. Park, has been bought by the latter. Mr. Park is blocking out ore in the mine, and it is expected a mill will be built next season.

The Uncle Sam M. Co. has let the contract for a 5-stamp quartz mill and saw mill, to be erected immediately near Gold Hill.

The Lone Star placer mine on Pleasant creek, C. E. Wickstrom, Jackson, owner, cleared up for the winter's run $2400.

JOSEPHINE COUNTY.

The Granite Hill Con. mines, on Louse Creek, near Grants Pass, have been bonded to J. L. Wiggings of Minneapolis, for $75,000, by Booth, Mangun et al. The first payment is due September 1. This is a placer and quartz mine combined, the placer having been worked for several years, while the quartz mine has a 5-stamp mill on it.

Dr. C. R. Ray, of Gold Hill, has bonded from G. Bolt the Sugar Pine quartz mine in Galice Creek district, and has men at work doing development work.

LAKE COUNTY.

C. MacK. Lane is said to have filed 720 placer claims, taking in all of Albert and Summer lakes, near Paisley, for the borax contained in the waters—or the borax supposed to be in the deposits under the lake waters.

MALHEUR COUNTY.

Prospectors and mining men have been rushing from Baker City to the new gold find on Snake river, just above Ontario. The gravel is 40 to 80 feet deep to bedrock and the gold, which is coarse, it is claimed, runs from $8 to $27 to the cubic yard. Snake river gold is usually very fine and difficult to save, and is generally found in sand in the river bars. The new strike is in gravel, and the rich ground is said to be 4 miles wide and 10 miles or more long. It is believed that not half who have started for the new gold field will be able to secure locations, so great has been the rush of prospectors there in the past few days.

UNION COUNTY.

The McDougal group of thirty claims at Homestead, on Snake river, a few miles above Ballard's landing, is being developed by W. B. McDougal. The zone of mineral covered by these claims runs northeast and southwest, and lies between two parallel lenses of lime, about 2 miles apart. The ore within the zone is not in regular veins, but exists more in the form of deposits. The country rock between the lime lenses is a porphyry, with occasional lime horses. The ores comprise copper glance, bornite and red oxide of copper. Mr. McDougal states that he will be able to make some shipments soon that will run 40% to 50% copper. His shipments will be by wagon to Baker City, 80 miles distant. The mine is being opened by tunnels.

Homestead, June 24.

SOUTH DAKOTA.

PENNINGTON COUNTY.

The Saginaw M. Co. of Yale, Mich., has struck a rich vein of free-milling ore near Custer. It is about 4 feet wide and assays about $70 per ton gold. It is to be developed along with other veins in the mine and a mill and cyanide plant will be installed this season. The company has bonded additional ground adjoining.

UTAH.

The United States assay office at Salt Lake City reports that the mineral production of Utah for the year 1900 exceeded in value that of 1899 by a large per cent, the principal increases being in the silver and copper produced. The totals for 1900 show: Gold, $4,035,610; increase, $529,028. Silver, $12,129,854; increase, $2,842,604. Copper, $2,324,076; increase, $782,042. Lead, $4,260,095; increase, $339,577. Totals, $22,759,635; increase, $4,493,251.

BEAVER COUNTY.

The Blue Jay mine in Washington district has been bonded to F. Sugden and L. H. Gray of Salt Lake City for two years at $50,000. Operations were suspended last fall after the company had expended $30,000 in sinking a new working shaft. A drift had been driven within a few feet of a known ore body. The lessees will develop this ore.

BOX ELDER COUNTY.

The Ione M. & M. Co. has been incorporated, capital $30,000. J. B. Toronto is president and R. W. Madsen of Salt Lake City secretary and treasurer. The company owns the Ione and twelve other mining claims in the Park Valley mining district.

JUAB COUNTY.

The Mammoth produces about 5500 tons of ore per month, milling 4000 tons of this and shipping the balance to the smelter. The mill concentrates run about 25% iron, 1% sulphur, 3% lead, 3½% copper, twenty-eight ounces silver and small values in gold. The Mammoth is the only concentrating mill now operating in Tintic district. Its process comprises stamps, Frue vanners, pans and settlers. This is the deepest mine in Utah, the lowest level being 2100 feet depth, where they are into sulphides. It is expected these workings may reach water level at no great additional depth.

The Emerald, under the management of M. L. Oglesby, is still pushing development. A shoot of ore was recently encountered on the sixth level, the mineral being copper and iron. A level is being run from the 700-foot station to cut under this ore body.

The Lower Mammoth, adjoining the Ajax on the west, is opened through a 700-foot tunnel, near the breast of which a large station is cut where an air compressor and hoisting plant are in operation. At this point a vertical shaft sinks 900 feet, cutting into a large ore body at 700 feet depth. The ore shoot runs north and south, dipping westward. It is believed the same vein outcrops on the Ajax farther northward. The ore is a well oxidized copper carbonate, with good values in copper and silver. On the 900-foot level the work shows the same extent of ore. On this level a stope 100 feet high has been carried 140 feet longitudinally with the shoot and the face of ore still looks the same. Much of the silver is in chloride form. The property ships about one car of ore per day. The compressor is operated by electric power, the hoist being operated by compressed air. Simon Bamburger is manager.

The Tesora is on Treasure hill, at the southern end of Tintic district. This locality is in the porphyry formation. The Tesora is perhaps a mile south of the contact that separates the lime formation of the Tintic range from the porphyry section referred to. While all the mines in the lime formation are destitute of water, even at 2000 feet depth, the workings on Treasure hill, in the porphyry belt, have run into strong water courses at 300 to 400 feet depth. The Tesora struck water level at 400 feet, from which point 300 gallons per minute are being pumped. Here also is a character of ore which differs some from the ores of the lime belt. Tesora ores from the 300 and 400-foot levels are in iron and copper sulphide, with no lead, and the shipping grades run as an average about 35% iron, 9% copper, twelve ounces silver and 80 cents gold to the ton, making an ore which will concentrate well. On the upper levels, as shown by the workings of some years ago, the ores were oxidized; but the continuous vein now exposed on the 300 and 400, trending from northeast to southwest, carries solid sulphide ore, about two-thirds of which may be classed as mill ore and one-third shipping ore. It runs only 5% or 6% silica, hence it will make a clean concentrate. On the 300-foot level are about 1200 feet of work on the vein, with numerous stopes started. On the 400 level about the same amount of work has been done, with practically all the ground between the two levels capable of being stoped to advantage. Thus, the vein is opened up a distance of 1000 feet on two levels, the ore appearing to be continuous throughout. About twenty tons per day of the high grades are being shipped. A concentrating mill, equipped with crushers, rolls, screens, jigs and tables, is being completed. It will be started up within thirty days. The company owning the Tesora is managed by Col. Heffron of the Bingham C. & G. Co., James Creighton being Supt. in charge. WASCOTT.

Silver City, May 23.

The Mammoth M. Co. has given C. Butters an option for five months on the 250,000 tons of tailings of the Mammoth mills, the price in case of the taking up of the option to be 50 cents a ton and the time five years. The tailings contain an average of $5 a ton. Tests are now to be made to determine the probable profit of treatment.

SUMMIT COUNTY.

The Summit M. Co., whose mines are 20 miles east of Park City, has decided to begin work. The action was taken by the directors at a meeting held at Coalville. J. H. Stallings and J. T. Hodson, members of the board, report an excellent showing of ore at the surface, the galena yielding as much as 60% lead, twenty to thirty-five ounces silver and $4 gold per ton. It is the intention to sink upon the lead at once.

The Western Monitor M. Co. has incorporated, capital $30,000, to operate the Great Western 1 to 5, the Sofia, Lady Louise and Terrible Swede mining claims at Park City. Considerable work has been done on the claims and men will again be put to work on the ground. A.

J. Fern is president and A. H. Steele secretary.

SALT LAKE COUNTY.

W. S. Earls has sold for $12,000 to the Tintic M. & Dev. Co. the Great Western mining claim at Bingham.

The St. Joe M. Co. has bought seventy-fourths interest in the Uhlig Nos. 1 and 2, the St. Joe No. 1 and the Ida mining claims at Bingham for $2434 40.

A sheriff's deed has transferred a half interest in the Monaco, Navajo and Silver Bell mining claims at Bingham to C. W. Heidel for $960.43.

W. F. Snyder has sold to S. M. Levy for $2000 the Adair, Thayer, Independence, Palmetto and Alhambra mining claims at Bingham, and S. M. Levy conveyed the same property to the Sampson M. Co.

WASHINGTON.

STEVENS COUNTY.

A compressor has been placed on the Acme mine, near Kettle Falls, by the Northwest M. Co. The company expects to run its 1300-foot tunnel before the end of the year. The daily advance is 6 feet. W. F. Stevens is Supt.

OKANOGAN COUNTY.

D. Hart has completed the organization in Oakland, Cal., of the Golden Ledge M. & M. Co. to operate a group lying west and adjoining the Triune. The intention of the company is to sink a 500-foot shaft. The contract for the first 50 feet has already been let, S. A. DeMerchant securing it. Mr. Hart is president and general manager of the company.

WYOMING.

UINTAH COUNTY.

The Native Copper group at Alta has been sold to Salt Lake people by M. J. O'Neil and J. Bettes for $10,000. The ground has been opened up by a shaft and tunnel, showing copper ore.

FOREIGN.

BRITISH COLUMBIA.

The Miner-Graves Syndicate have secured the Virginia and the Cromwell mines, in the Trout Lake mining district, and it is said will expend $10,000 in development work.

The Triune, in the Lardeau, is shortly to start work again.

The Metropolitan and Sunset, a couple of North Fork properties, will be worked extensively this season.

The Lorne mine in the Lillooet district has closed down. The reason given is that the ore in the lower levels has turned base and cannot be treated with the present milling plant.

J. McK. Anderson, Western manager of the Gold Hill Exploration Co. of Toronto, is in Lardo and intends putting men on the Copper Queen group and other properties owned by the company.

The International and Happy Medium claims, situated in Nelson division, on Twelve Mile creek, has been bonded by R. E. Fishburn at $12,000. A contract to run a tunnel has been let.

The Silver King mine of Nelson is sinking a shaft 1000 feet and expect to have it completed withing the next thirty days. When completed it will be the deepest shaft in British Columbia.

The Poorman mine, Nelson, has closed down temporarily, owing to an accident to the air compressor.

Nelson, June 18.

The Lawry Syndicate has started development on the Nicola claim, in the Nicola district, bonded to the syndicate at $10,000.

KLONDIKE.

Some people have come into Dawson from Stewart river. They say the prospectors who are working there seem to be very well satisfied with their prospects. They also report that there is plenty of good quartz and think the district will develop more in lode mining than in placer mining. W. C. Young is down from Clear creek, where he is mining recorder. He reports Clear creek a summer proposition entirely, and says this season will determine its value as a placer producer. He says that a couple of men are taking out high wages on a Stewart river bar below the mouth of Clear creek.

A rich gold find has been made on No. 7 above discovery on New Dominion creek. The discovery was made on comparatively old claims, but on lower bedrock. Pans of gold taken out ran, it is said, as high as $32, and nuggets worth $70 and $80 each were picked up.

MEXICO.

The Candelaria M. Co. of Denver, Colo., has been advised by its Supt. at Parrall that the railroad has promised to run a spur to the mines. The company will now go ahead with its construction of a 50-ton cyanide mill. The company has a 12-ton mill on the ground and it is proposed to increase the capacity to fifty tons.

Personal.

E. MANSFIELD of London, Eng., is in Nelson, B. C.

CHARLES ROBINS has been appointed foreman of the Globe group, Shasta Co., Cal.

GEORGE C. ROBERTS of Washington, D. C., Director of the Mint, is in San Francisco.

A. J. BLACKBURN of Grass Valley, Cal., has been elected Supt. of the Tule Belle mine at that place.

H. LEE HUSTON, formerly assayer for the Golconda mine, Sumpter, Ore., has gone to Rogers, N. M.

J. O. JONES, after two years at Urga, Mongolia, superintending mines, has returned to San Francisco.

CARL HAND of Salt Lake City, Utah, has gone to the island of Celebes to examine some copper mines.

A. D. CULLOM AND E. J. ANDREWS of the Castle Peak mines, Mono county, Cal., have gone to London on a visit.

ROBERT J. CORY, the western manager of the Allis-Chalmers Co., has returned to Denver, Colo., from Salt Lake City, Utah.

JAMES GILES, of Butte City, Mont., has been appointed foreman of the Winthrop mines, Copper City, Shasta Co., Cal.

C. T. DURELL has just returned to Denver having been in southern Arizona examining copper properties for the past three weeks.

HENRY BRATNOBER of London is at Ketchikan in southern Alaska examining the Mount Andrew copper mines on Prince of Wales island.

PATRICK CLARK AND MAJOR B. C. KINGBURY of Spokane, Wash., are at Ketchikan examining mining properties on the Prince of Wales island.

T. C. ARCHER, M. E., formerly Supt. of the mines at Iron Mountain, Shasta county, is at present in charge of the Zeekendorf mines in southern Arizona.

E. P. JENNINGS has returned to Salt Lake City, Utah, from an examination of copper ore deposits on Princess Royal island, on the British Columbia coast, a short distance south of the Alaskan boundary.

W. H. LA PERLE of the Trent Engineering & Machinery Co., has returned to Salt Lake City, Utah, from De Lamar, Shasta county, Cal., where he has been superintending the building of the De Lamar smelter.

S. E. BRETHERTON, formerly manager of the Silver City smelter, N. M., now of Denver, Colo., has returned from a trip to Mexico, where he has been examining some large mines to decide the best method of treating the ores.

PROF. S. P. LANGLEY, the astronomer and secretary of the Smithsonian Institute of Washington, is in San Francisco to make arrangements by which the Smithsonian will gain complete information from the best available sources concerning the animal and vegetable life, topography and climatic conditions of the Philippines.

Commercial Paragraphs.

THE Stilwell-Bierce & Smith-Vaile Co. of Dayton, O., has recently received large orders from Canada for the Victor turbines. The orders include two 1000 H. P. Victor high-pressure turbines for driving pulp grinders, one 500 H. P. Victor high-pressure wheel for driving the screens and wet machines, and one 100 H. P. wheel for electric lighting. These wheels are to operate under 240 feet head and are for the Ouiatchouan Pulp Co., Ouiatchouan, P. Q., Canada.

H. D. CRIPPEN, manufacturer of the Jackson hand-power rock drill, has awarded the $50 prize, for the best flash-light photograph of the drill in practical operation, to Mrs. Emily Rice of Cheyenne, Wyo. The photograph taken was of a drill operated by J. D. Kazar of Hecla, Wyo., in the Lenox tunnel, who says that "in running 150 feet through granite, one man using the Jackson hand-power drill makes from 18 to 20 inches an hour, while the speed of two men, double-handed, in the ordinary mode of drilling, is from 5 to 6 inches an hour."

THE Allis-Chalmers Co. announces, under date of June 10, 1901, that it has acquired the entire business of the Edward P. Allis Co., Milwaukee, Wis.; Fraser & Chalmers, Chicago, Ill.; Gates Iron Works, Chicago, Ill.; Dickson Mfg. Co. (exclusive of locomotives), Scranton, Pa. The Allis-Chalmers Co. will continue to build, under the same management, the same lines of machinery as heretofore manufactured by the several companies, and hopes to merit a continuance of the generous patronage accorded the several companies in the past. The general offices are in the Home Ins. Bldg., Chicago, Ill.

THE Ericsson Telephone Co., No. 296 Broadway, New York City, states that the Ericsson telephone was awarded first prize at Paris, 1881; Madrid, 1883; Vienna, 1884; Stockholm, 1886; Copenhagen, 1888; and Chicago, 1893. Also, that their exhibit in Paris in 1900 was from the St. Petersburg, Russia, factory, and was also awarded first prize. This year their exhibit at the Pan-American Exposition at Buffalo, of a 50-subscriber switchboard and some of their several styles of telephones, is in Section S of the Electricity Building, and Mr. W. J. Marland will show friends and patrons their exhibit.

THE Allis-Chalmers Co. has just closed the contract with the United States Mining Co. of Utah for entirely equipping their new 1000-ton copper matting and converting plant to be erected at Murray, near Salt Lake City. This machinery will consist in part of six blast furnaces 42″x180″, six converter bowls 84″x126″, with two stands and the hydraulic accumulator and pumps for same; the blowing engine for converter, one tandem-compound Reynolds power engine, and three large blowing engines for the blast furnace work. These blowing engines are used in preference to the rotary blowers ordinarily used, the three named having a displacement of 75,000 cubic feet of free air per minute at 2½ pounds pressure. The blowing cylinders are all of the Edwin Reynolds' design and are driven by cross-compound condensing Reynolds' Corliss engines. Added to this order is a 50-drill Reynolds' air compressor, with Corliss compound steam end and compound air end. The Bingham Copper & Gold Mining Co., also located near Murray, recently decided to add a converting plant to their smelting plant, and have placed the order for it with the Allis-Chalmers Co.; this will consist of Corliss blowing engine and the necessary converter bowls and stands.

New Patents.

DEWEY, STRONG & CO.'S SCIENTIFIC PRESS PATENT AGENCY, 330 Market St., S. F., has official reports of the following U. S. patents issued to Pacific coast inventors:

FOR WEEK ENDING JUNE 18, 1901.

676,651.—CURTAIN SUPPORT—J. N. Anderson, Mono Lake, Cal.
676 834.—NON-REFILLABLE PACKAGE—L. Blatz, La Mirada, Cal.
676,456.—VOTE RECORDER—A. J. Bolfing, S. F.
676,427.—CONCENTRATOR—W. G. Dodd, S. F.
676,603. — LID FOR COOKING UTENSILS — A. H. Drake, Union, Or.
676,534.—CONCENTRATOR—T. Dynan, Amador, Cal.
676,715.—BOTTLE—F. Franz, S F.
676,554.—FISHING ROD TIP—W. Friedlander, Portland, Or.
676,608.—STEAMING FRUIT, ETC.—W. E. Hale, Alameda, Cal
676,748.—FURNITURE DRAWER — R. G. Hargrave, Colfax, Wash.
676,504 —STRAW STACKER—M. B. Kassel, Pomeroy, Wash.
676,437.—PRINTING PRESS — Knoch & Vogel, Los Angeles, Cal.
676,542.—PUMP—S. W. Luitweiler, Los Angeles, Cal.
676,566.—FURNACE—A. Magnuson, Emeryville, Cal.
676 544.—BED—F. Martin, S. F.
676,470.—GUITAR—W. W. Oakes, Seattle, Wash.
676,704. — PROTECTING PILES — S. L. Shufleton, Seattle, Wash.
676,518.—OIL BURNER—A. C. Steuart, Santa Paula, Cal.
676,856.—WHEEL HUB—E. H. Wagener, Modesto, Cal.

Notices of Recent Patents.

Among the patents recently obtained through Dewey, Strong & Co.'s SCIENTIFIC PRESS U. S. and Foreign Patent Agency, the following are worthy of special mention:

APPARATUS FOR STEAMING AND SPICING DRIED FRUIT.—No. 676,608. June 18, 1901. C. E. Hale, Alameda, Cal., assigned to the J K. Armsby Co, of Chicago, Ills. This invention relates to an apparatus which is designed for steaming or spicing dried fruits of any description which are capable of such treatment. It comprises a containing chamber for the fruit, a perforated pipe extending into the chamber, a hood within the chamber having its upper portion enclosing the pipe, said hood being perforated to permit the vapor delivered from the pipe to be discharged into the mass of fruit which covers and surrounds the hood. In conjunction with this is a chamber adapted to contain flavoring material, and means for directing the vapor through the flavoring material before it reaches the fruit containing chamber.

HEATING FURNACES.—No. 676,566. June 18, 1901. A. Magnuson, Emeryville, Cal. The object of this invention is to provide a means for preventing the escape of heat through the doors of furnaces which are used for heating purposes and which have a strong blast. It is also designed to prevent a too free escape of heat through the top of the furnace. It consists of an enclosure forming wind boxes extending beyond the front and these boxes are so arranged with relation to the door openings that a blast of air may be directed across said openings so as to cut off and prevent the discharge of hot air outwardly from the furnace. Channels are made through the hearth below the opening so that the blast passes also through these channels.

WHEEL HUB AND BOX THEREFOR.—No. 676,856. June 18, 1901. Mrs. S. J. Willson, Administratrix of E. H. Wagener, Modesto, Cal. This invention relates to improvements in wheel hubs and boxes therefor, and is especially adapted for sulky or gang plows which are mounted upon wheels. It consists of an independent journal box fitting the hub of the wheel and turnable therein, and means for removably locking the box within the hub. Dust caps or sleeves are fitted to chambers in the ends of the box, and means for holding the wheel in place so that the dust caps are held stationary while the wheel and journal-box are turnable.

CAN COOLING MACHINE.—No. 676,070. June 11, 1901. Erik Manula, Astoria, Or. This invention relates to improvements in machines for cooling cans after they have come from the soldering machine It consists essentially of a revoluble reservoir having an annular cooling platform or table upon which the cans are delivered automatically in upright position, guides by which the cans are moved outwardly on this table in the course of the revolution of the latter, and means for delivering water to and from the reservoir.

Latest Market Reports.

SAN FRANCISCO, June 27, 1901.

SILVER.—Per oz., Troy: London, 27 5/16d (standard ounce, 925 fine); New York, bar silver, 59⅝c nominal (1000 fine); San Francisco, 59⅝c; Mexican dollars, nominal San Francisco, 47½c New York.

COPPER.—New York: Lake, 1 to 3 casks, $17.25; carload lots, $17.00; Electrolytic, 1 to 3 casks, $16.75; carload lots, $16.62½; Casting, 1 to 3 casks, $16.60; carload lots, 16.50. San Francisco: 18. Mill copper plates, 20c; bars, 22@23c. London: £67 17s 6d per ton.

LEAD.—New York, $4.37½; Salt Lake City, $4.00; St. Louis, $4.32½; San Francisco $4.90, carload lots; 5½c 1000 to 4000 lbs.; pipe 6, sheet 6½, bar 5½c; pig, $5.25. London, £12 7s 6d per ton=2.67½ cents per ℔.

SPELTER. — New York, $4.20; St. Louis, $3.75; London, £16 2s 6d per ton =3.58½ cts. per ℔; San Francisco, ton lots, 5½c; 100-lb lots, 6c.

ANTIMONY.—New York, Cookson's, 10c; Hallett's, 9c; San Francisco, 1000-lb. lots, 10c; 300 to 500 lbs., 11c; 100-lb. lots, 13@15c.

IRON.—Pittsburg, Bessemer pig, $17.25; gray forge, $16.50; San Francisco, bar, per lb., 2.65c in small quantities.

STEEL.—Bessemer billets, Pittsburg, $24; open hearth billets, $27.00; San Francisco, bar, 7c to 12c per lb.

TIN.—New York, pig, $26.00; San Francisco, ton lots, 30c; 1000 lbs., 30½c; 500 lbs., 30½c; less, 31c; bar tin, ₱ ℔, 35c.

QUICKSILVER. — New York, $51.00 large lots; London, £9 2s 6d; San Francisco, local, $48.00 ₱ flask of 76½ lbs.; Export, $45.00

MAGNESIUM.—New York, $2.90 ₱ ℔.; San Francisco, $3.75.

ZINC.—San Francisco, 5½c; slab, 5¾c; bar, 7c; zinc dust, N. Y., 8c.

BABBITT METAL.— San Francisco, No. 1, 10c.

SOLDER. — Half-and-half, 100-℔. lots, 19c; San Francisco, Plumbers', 100-℔. lots, 15¾c.

PHOSPHORUS. — F. o. b. New York 50@60c ₱ ℔.

ASSAY LITHARGE.—San Francisco, 10c ₱ ℔, small lots.

BISMUTH.—New York, ₱ ℔., $2.25 50-℔ lots; San Francisco, $2.50 to $2.75 ℔ lots.

PLATINUM.—San Francisco, crude, $22 ₱ oz.; New York, $22 per Troy oz

FERRO-MANGANESE. — Pittsburg, 80%, domestic, $62.50, large lots.

ALUMINUM.—New York, No. 1, 99% pure ingots, 35c; No. 2, 90%, 30c to 35c.

TUNGSTEN.—New York, ₱ ℔., 95c; San Francisco, $1.15.

FERRO-TUNGSTEN. — New York, 37%, 32c; San Francisco, 65c (60%).

NICKEL.—New York, 50@60c ₱ ℔.

POWDER.—F. o. b. San Francisco: No. 1. 70% nitro-glycerine, per ℔., in carload lots, 15½c; less than one ton, 17½c. No. 1*, 60%, carload lots, 13½c; less than one ton, 15½c. No. 1** 50%, carload lots, 11¾c; less than one ton, 13¾c. No. 2, 40%, carload lots, 10c; less than one ton, 12c. No. 2* 35%, carload lots, 9½c; less than one ton, 11½c. No. 2** 30% carload lots, 9c; less than one ton, 11c. Black blasting powder in carload lots, minimum car 728 kegs, $1.50 per keg; less car lots, $2 per keg.

CAPS.—3x, $5.50 per 1000; 4x, $6.50; 5x, $8; Lion, $9, in lots not less than 1000.

FUSE.—Triple tape, $3.60 per 1000 feet; double tape, $3.00; single tape, $2.65; Hemp, $2.10; Cement No. 2, $3.00; Cement No. 1, $2.65, in lots of 3000 feet and up.

Recently Declared Mining Dividends.

	Payable.
Silver Bar Copper M. Co., New Mexico, No. 1, 6 cents per share, $5400	June 18
Sacramento M. Co., Utah, monthly, ½ cent per share, $10,000	July 1
May Day M. Co., Utah, No. 2, 2½ cents per share, $10,000	July 1
Helena G. M. Co., O., monthly, ½ cent per share, $5000	June 25
Ingham Con. G. M. Co., Colo., monthly, ½ cent per share, $3399	June 28
Le Roi No. 2 M. Co., B. C., $1.20 per share, $144,000	June 29
Pacific Coast Borax Co., monthly, $1 per share, $19,000	June 29

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NOTICE.

The JAMESTOWN MINING AND MILLING COMPANY beg to announce to the public that they are now open for its inspection. Their property consists of three full mining claims in the very heart of the great gold district of Tuolumne County. Among their property is the well known "BADGER" mine, which is adjacent to the famous "ROYAL," for which an offer of $1,500,000 was recently refused. The ore of the Badger mine is ribbon quartz having an average of $15 in free gold and carrying about one and one-half per cent of sulphurets assaying from $250 to $300 per ton. With improved machinery, the cost of mining and milling will not exceed $2.25 per ton. Now, in view of the fact that the JAMESTOWN M. & M. CO. realize that, in order to make their mines productive and paying properties, they must equip and prepare the mines for the extraction of ore, they will place 25,000 shares of their treasury stock, which is 100,000 shares, on the market at the very low price of 50 cents per share; which will place the mine on a first-class paying basis, in view of the developments already done on the mine. And they are confident that the last 50,000 shares will have a value of $2.50 per share. To those contemplating an investment, this is a first-class proposition and one that cannot afford to be overlooked, as it will bear the closest investigation. PROSPECTUS and the fullest information can be had at the Company's office, Room 21, No. 40 Montgomery St., San Francisco.

J. W. BYRD, Secretary.

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WANTED. — PROPERTIES CONTAINING **MAGNETIC PYRITES** or **SULPHURETS** by parties who mean business. Address samples and particulars to Dr. Beecher, Oliver Hotel, Corner Mason and Pine Sts., San Francisco, California.

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One 20 H. P. Upright, one 30 H. P. and one 40 H. P. Horizontal, Boilers; also a 30 or 35 H. P. Engine and one 15 H. P. ditto. Belting.

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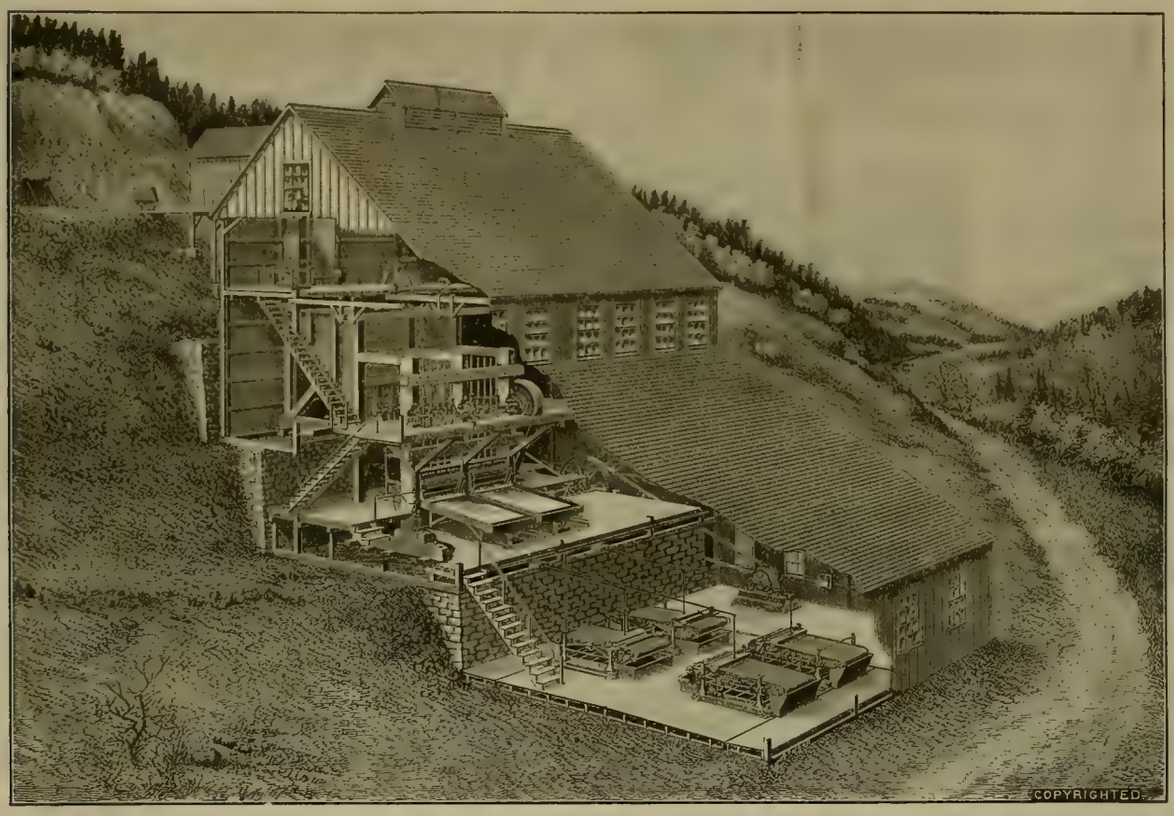

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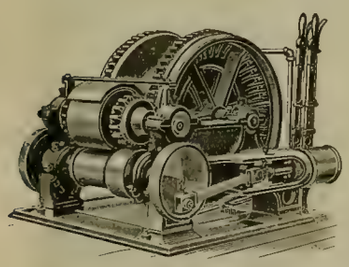

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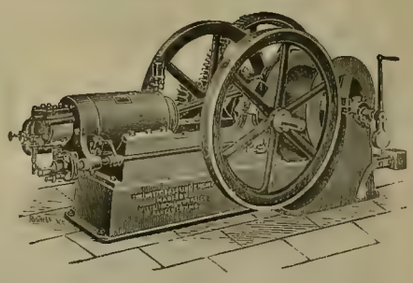

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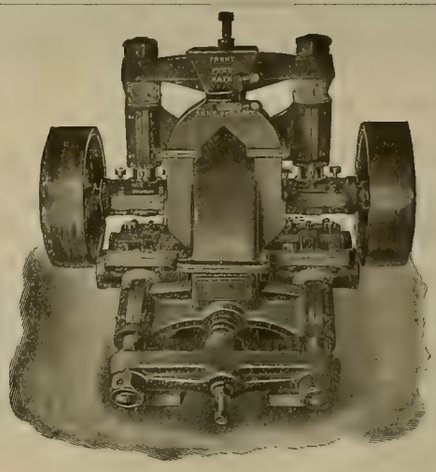

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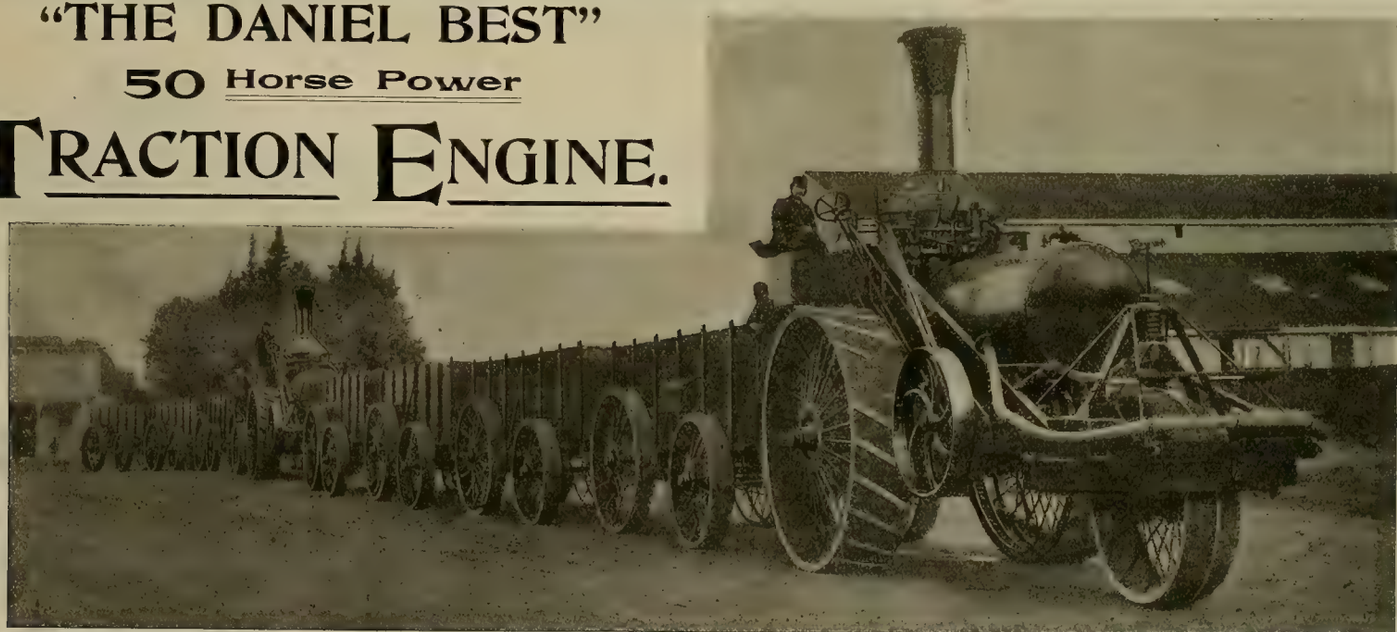

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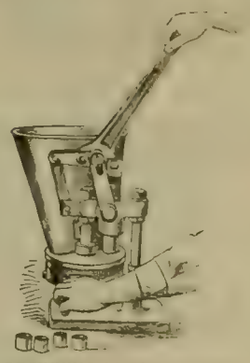
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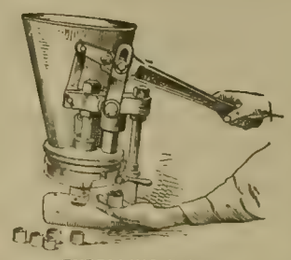
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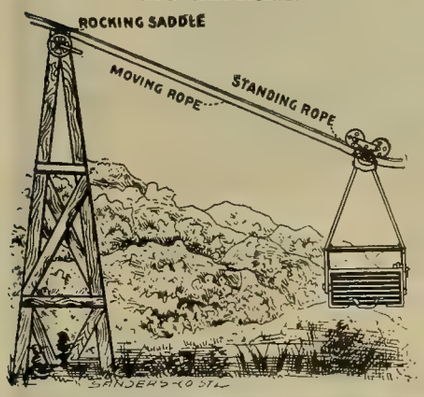

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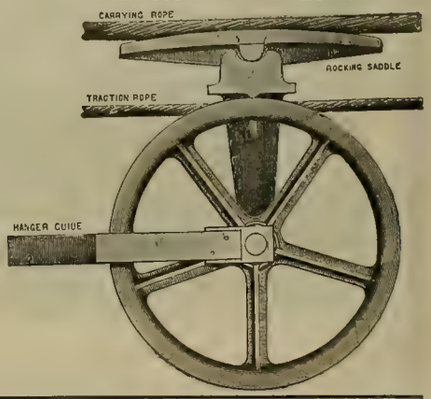

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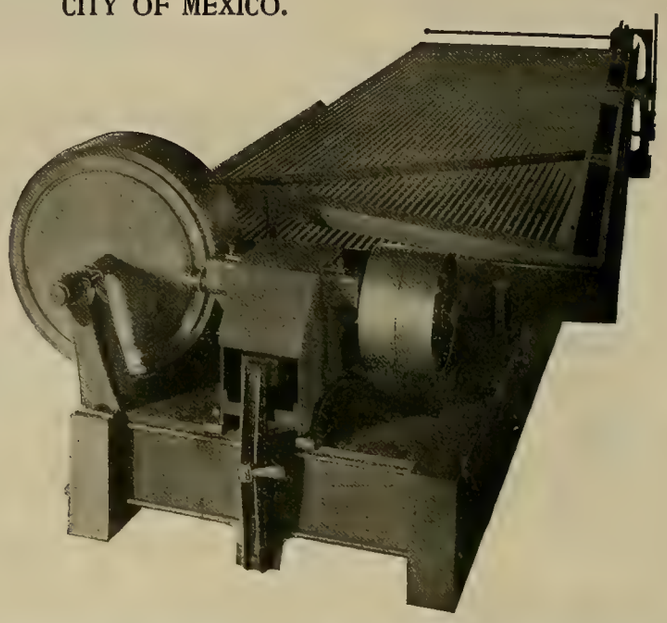

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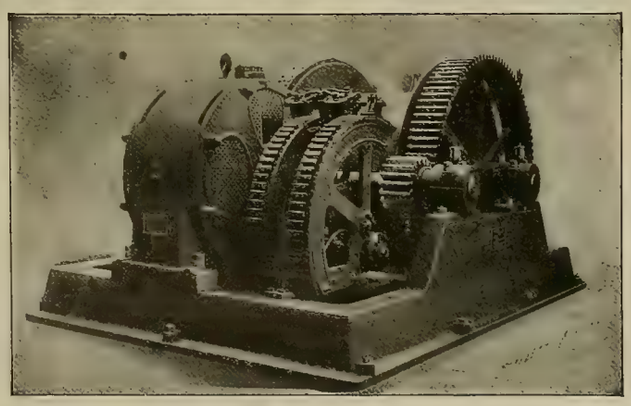

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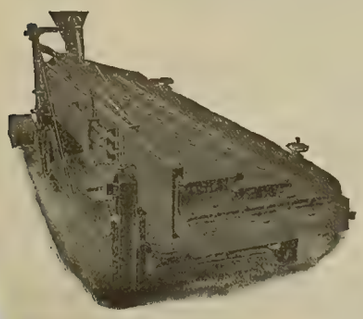

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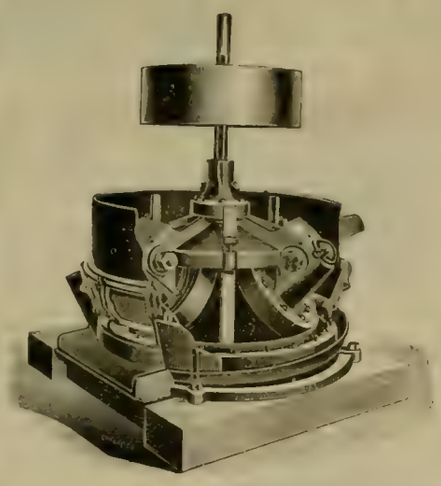

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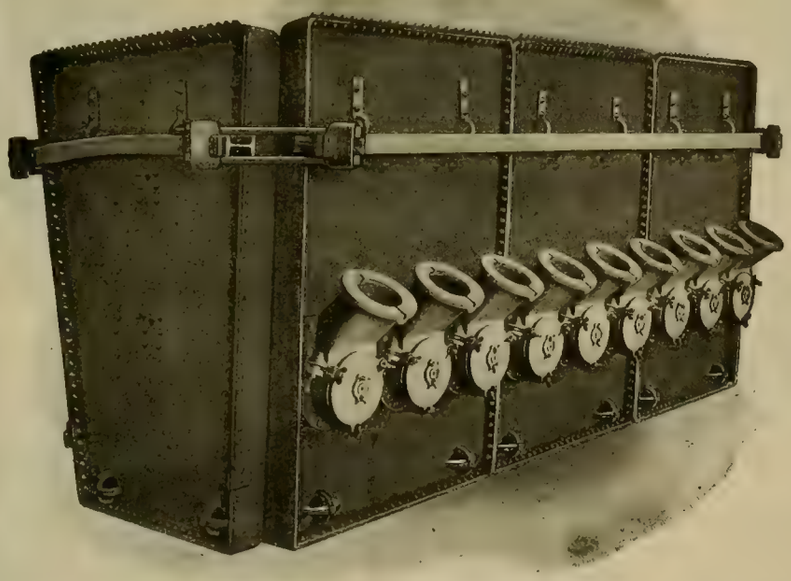

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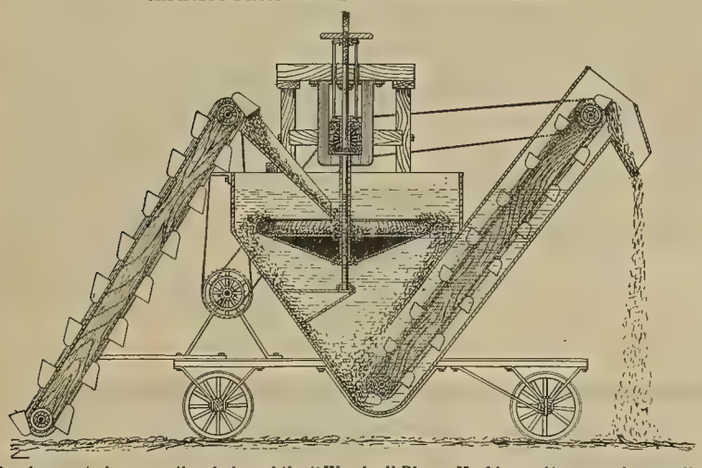

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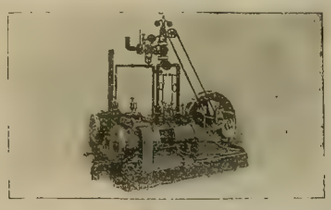

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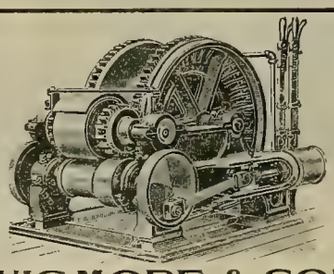

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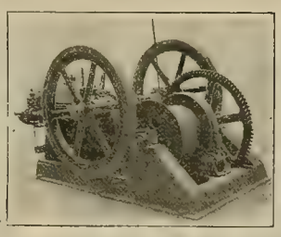

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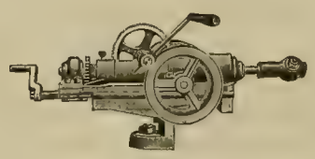

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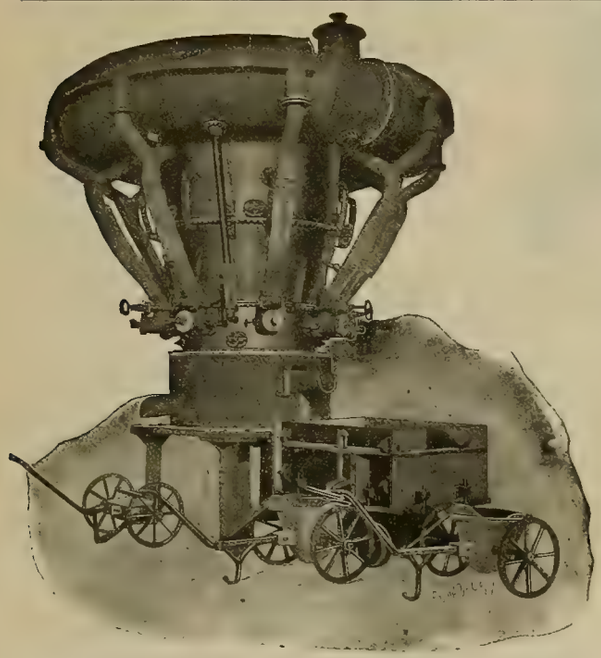

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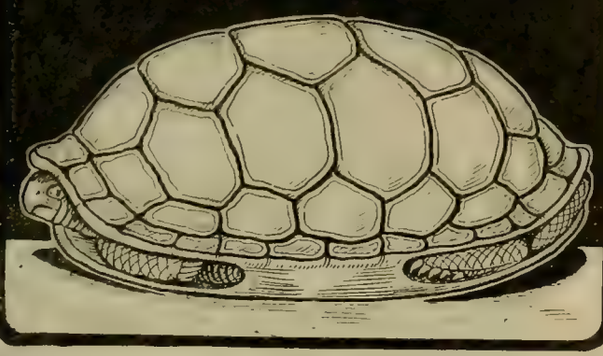

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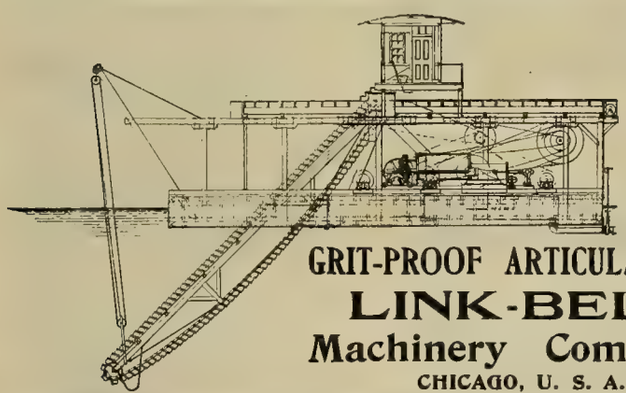

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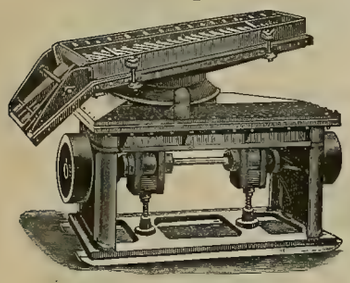

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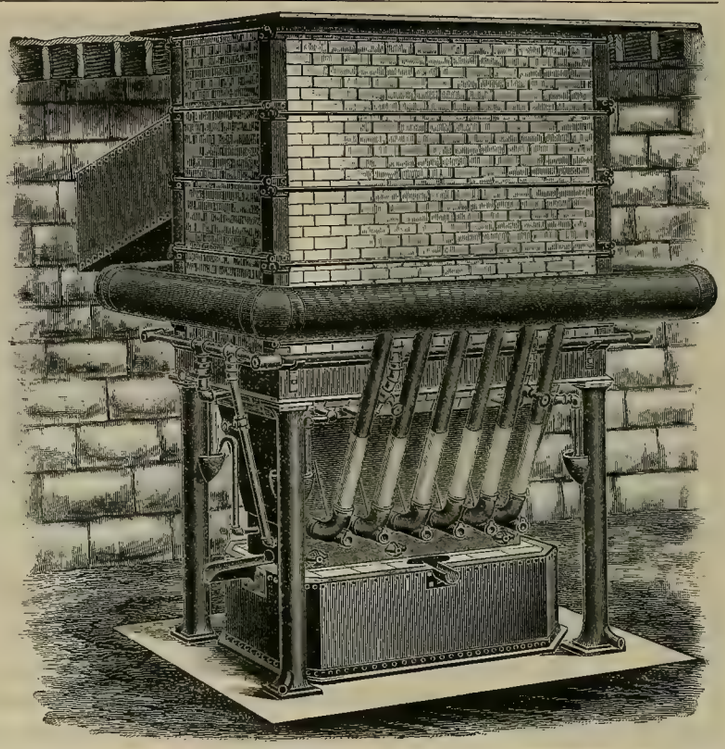

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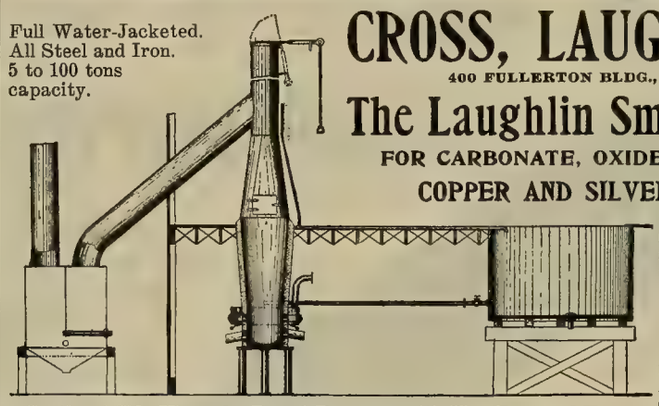

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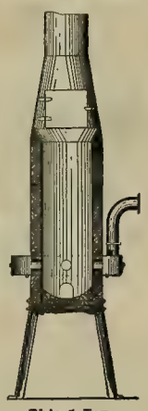

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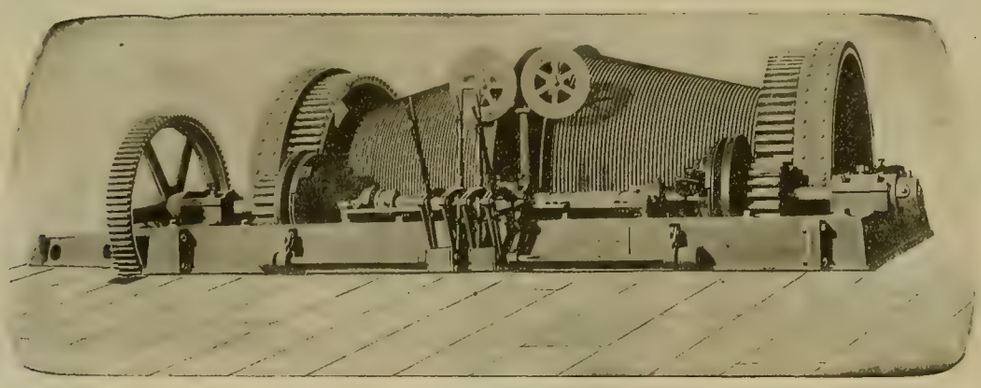

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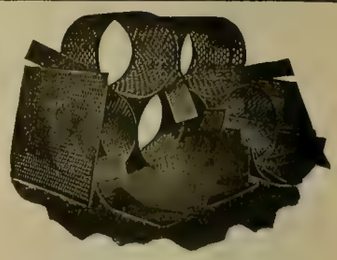

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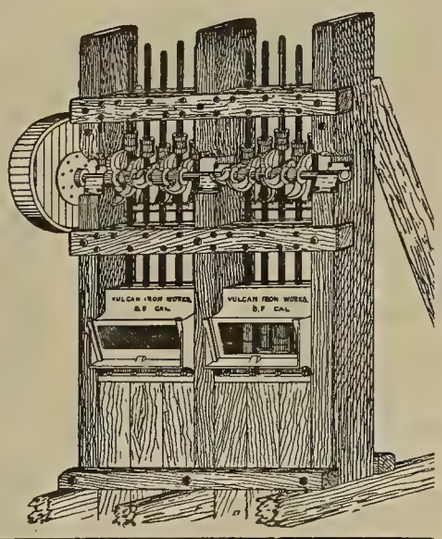

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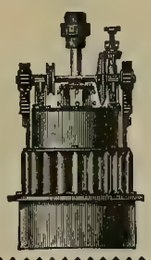

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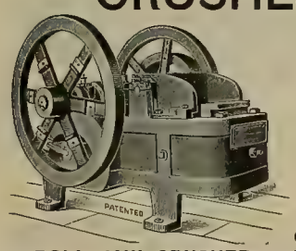

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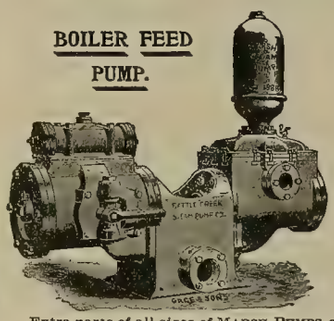

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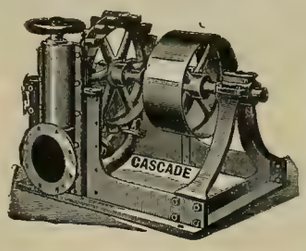

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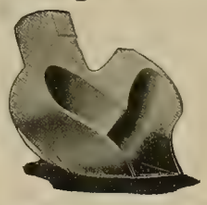

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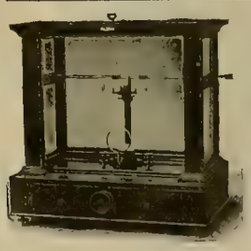

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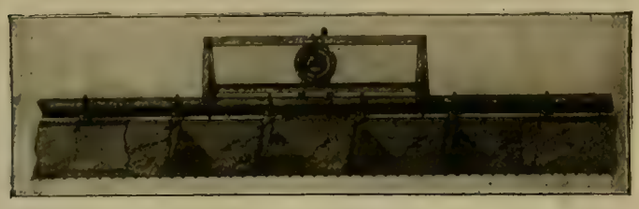

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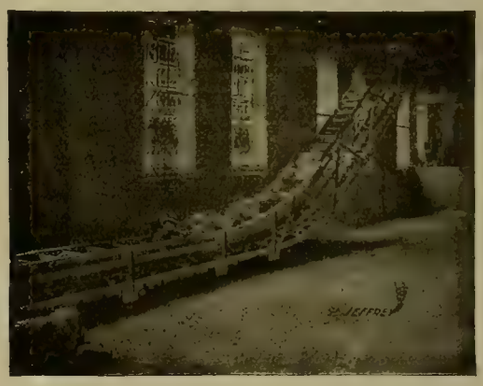

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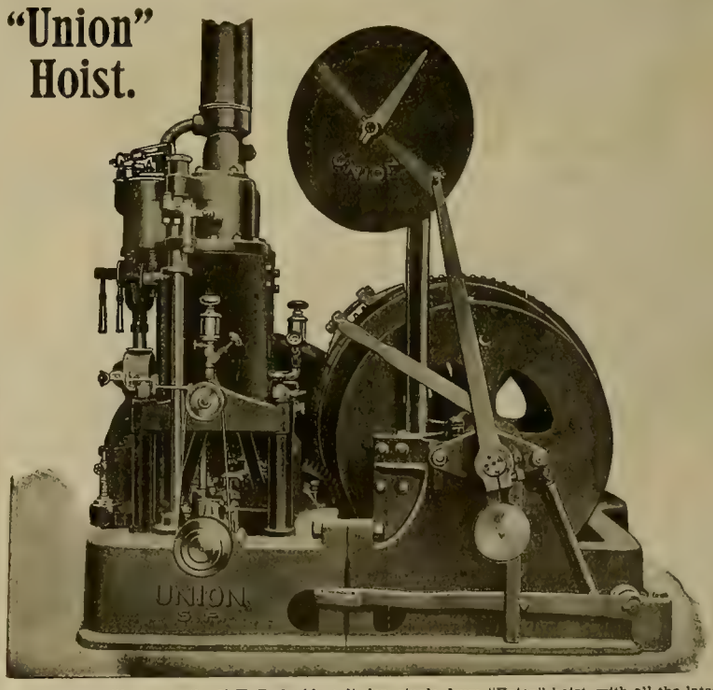

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FRANK E. CORDES, Secretary.

Office—Room 8, 206 Sansome street, San Francisco, California.

MARIPOSA COMMERCIAL AND MINING COMPANY.—Location of principal place of business, San Francisco, California; location of works, Mariposa County, California.

Notice is hereby given, that at a meeting of the Board of Directors, held on the 15th day of June, 1901, an assessment (No. 23) of Ten ($10) Dollars per share was levied upon the capital stock of the corporation, payable immediately in United States gold coin, to the secretary, at the office of the company, Room 223 Crocker Building, San Francisco, California.

Any stock upon which this assessment shall remain unpaid on the 10th day of August, 1901, will be delinquent, and advertised for sale at public auction; and unless payment is made before, will be sold on MONDAY, the 2nd day of September, 1901, to pay the delinquent assessment, together with the costs of advertising and expenses of sale.

By order of the Board of Directors.

ALEX. GRANGER, Secretary.

Office—Room 223 Crocker Building, San Francisco, California.

TANANA MINING COMPANY.—Location of principal place of business, San Francisco, California.

Notice is hereby given, that at a meeting of the Board of Directors, held on the 14th day of June, 1901, an assessment (No. 3) of ten (10) cents per share was levied upon the capital stock of the corporation, payable immediately in United States gold coin, to the secretary, at the office of the company, Room 801 Claus Spreckels Building, San Francisco, California.

Any stock upon which this assessment shall remain unpaid on the 23d day of July, 1901, will be delinquent, and advertised for sale at public auction; and unless payment is made before, will be sold on TUESDAY, the 13th day of August, 1901, to pay the delinquent assessment, together with the costs of advertising and expenses of sale.

By order of the Board of Directors.

EDWARD H. STEARNS, Secretary.

Office—Room 801 Claus Spreckels Building, San Francisco, California.

YUBA CONSOLIDATED GOLD MINING COMPANY.—Location of principal place of business, San Francisco, California; location of works, Nevada County, California.

Notice is hereby given, that at a meeting of the Board of Directors, held on the 22d day of June, 1901, an assessment (No. 2) of three cents per share was levied upon the capital stock of the corporation, payable immediately in United States gold coin to the secretary, at the office of the company, Room 801, Claus Spreckels Building, San Francisco, California.

Any stock upon which this assessment shall remain unpaid on the 30th day of July, 1901, will be delinquent and advertised for sale at public auction; and unless payment is made before, will be sold on MONDAY, the 19th day of August, 1901, to pay the delinquent assessment, together with the costs of advertising and expenses of sale.

By order of the Board of Directors.

EDWARD H. STEARNS, Secretary.

Office—Room 801, Claus Spreckels Building, San Francisco, California.

THE UNDERSIGNED, TRUSTEE IN BANKruptcy of Wolff & Zwicker Iron Works, bankrupt, is about to offer for sale the entire plant of that company, consisting of foundry, machine shop, pipe shop, boiler shop, blacksmith shop, and ship tools.

The plant comprises about three acres of land and the buildings thereon, situated in the city of Portland, Oregon, at the east end of the Madison Street bridge on Hawthorne avenue, East Water street, and having a frontage on the Willamette river.

Parties interested are invited to correspond with the trustee; will furnish full particulars, and inspection is invited.

H. G. PLATT,
Trustee in Bankruptcy, Wolff & Zwicker Iron Works, Bankrupt.

Placer Deposits.

Parties interested in placer deposits that cannot be successfully operated, owing to a lack of water, should communicate with THOMAS A. EDISON, Orange, N. J.

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DELINQUENT SALE NOTICE.

AMERICAN OIL AND REFINERY COMPANY.—Location of principal place of business, San Francisco, California; location of works, Contra Costa County, California.

NOTICE.—There are delinquent upon the following described stock, on account of assessment (No. 3) levied on the 26th day of March, 1901, the several amounts set opposite the names of the respective shareholders, as follows:

Names.	No. Cert.	No. Shares.	Amt.
Allen, S. L.	110	12	$ 60
Anderson, Mrs. Lulu	270	2	10
Anthony, J. C., Trustee	797	1,000	50 00
Anthony, J. C., Trustee	798	1,000	50 00
Anthony, J. C., Trustee	799	1,000	50 00
Anthony, J. C., Trustee	800	500	25 00
Anthony, J. C., Trustee	801	500	25 00
Anthony, J. C., Trustee	802	500	25 00
Anthony, J. C., Trustee	803	500	25 00
Anthony, J. C., Trustee	531	501	25 00
Anthony, J. C., Trustee	973	1,000	50 00
Anthony, J. C., Trustee	1021	4,300	216 00
Avery, Mrs. Jennie	716	5	25
Avery, Mrs. Jennie	729	5	25
Barto, Harrison	808	2,500	125 00
Barto, Harrison	812	500	25 00
Barto, Harrison	813	500	25 00
Barto, Harrison	814	500	25 00
Beneckke, Diederich	93	1	05
Bgorkman, Mrs. Augusta	712	35	1 75
Brown, Mrs. Ida M	152	7	35
Buckley, Morris	788	50	2 50
Carr, H. W.	719	5	25
Conn, Mrs. Sarah A.	529	20	1 00
Conn, Mrs. S. A.	693	25	1 25
Corbiere, O. C.	564	250	12 50
Corbiere, C. C.	565	5	25
Crew, L. T.	206	2	10
Cridge, A. D.	503	1	05
Cumberson, Mrs. Maria L.	171	5	25
Donnelly, Mary M.	49	14	70
Dunlap, Mrs. W. B.	526	10	50
Donahue, Benj. S.	1141	500	25 00
Eells, Charles P.	984	2,000	100 00
Eells, Charles P.	1127	10,000	500 00
Estey, J. C.	1045	100	5 00
Estey, J. C.	1048	20	1 00
Falls, Sarah	557	40	2 00
Fetrow, Mrs Maria W.	172	3	15
Fisk, Andrew J.	366	2	10
Freese, A. J.	6	40	2 00
Freese, A. J.	7	40	2 00
Freese, A. J.	9	50	2 00
Freese, A. J.	278	10	50
Freese, A. J.	279	10	50
Freese, A. J.	280	20	1 00
Freese, A. J.	281	20	1 00
Freese, A. J.	282	20	1 00
Freese, A. J	283	20	1 00
Freese, A. J.	284	345	17 25
Freese, A. J.	450	20	1 00
Freese, A. J.	659	50	2 50
Freese, A. J	671	9	45
Hildebrandt, Henry	256	65	3 25
Hildebrandt, Henry	257	100	5 00
Hildebrandt, Henry	258	1,000	50 00
Hoover, John D., Trustee	981	667	33 35
Hoover, John D., Trustee	1060	433	21 65
Hoover, Miss Esther	979	100	5 00
Holbrook, W. E., Trustee	897	10,000	500 00
Holbrook, W. E., Trustee	898	11,000	550 00
Holbrook, W. E., Trustee	899	4,500	225 00
Holbrook, W. E., Trustee	900	4,500	225 00
Holbrook, W. E., Trustee	958	2,000	100 00
Holbrook, W. E., Trustee	959	2,000	100 00
Holbrook, W. E., Trustee	960	2,000	100 00
Holbrook, W. E., Trustee	974	2,000	100 00
Holbrook, W. E., Trustee	994	1,200	60 00
Holbrook, W. E., Trustee	995	1,000	50 00
Holbrook, W. E., Trustee	996	1,000	50 00
Holbrook, W. E., Trustee	997	1,000	50 00
Holbrook, W. E., Trustee	998	1,000	50 00
Holbrook, W. E., Trustee	999	1,000	50 00
Holbrook, W. E., Trustee	1000	1,000	50 00
Holbrook, W. E., Trustee	1001	1,000	50 00
Holbrook, W. E., Trustee	1118	2,000	100 00
Holbrook, W. E., Trustee	1119	2,000	100 00
Holbrook, W. E., Trustee	1123	2,000	100 00
Kessing, E. L.	838	15	75
Lucas, Mrs. T. R.	848	10	50
McCuen, Mrs. N.	305	2	10
McAllister, H. L.	1071	100	5 00
Murrey, Peter William	70	1	05
Niederost, August	207	28	1 40
Opitz, Conrad B.	343	10	50
Peters, W. S.	60	15	75
Peters, W. S.	333	500	25 00
Peters, W. S.	672	5	25
Pipher Jos. E.	102	2	10
Reynolds, Timothy	21	5	25
Schindler, Louis C.	303	2	10
Shead, Mrs. Dora L.	920	100	5 00
Smith, James B., Trustee	985	1,000	50 00
Smith, James B., Trustee	986	1,000	50 00
Smith, James B., Trustee	987	1,000	50 00
Smith, James B., Trustee	988	1,000	50 00
Smith, James B., Trustee	989	1,000	50 00
Smith, James B., Trustee	990	1,000	50 00
Smith, James B. Trustee	991	1,000	50 00
Smith, James B., Trustee	992	500	25 00
Tarpey, W. J.	675	14	70
Walser, Mrs. Lizzie	332	125	6 25
Young, Richard	746	91	4 55
Young, Richard	754	167	8 35
Young, Richard	758	100	5 00
Young, Richard	761	328	16 40

And in accordance with law, and an order from the Board of Directors, made on the 26th day of March, 1901, so many shares of each parcel of such stock as may be necessary, will be sold at public auction at the office of said corporation, in Rooms 322-323 Parrott building, San Francisco, California, on MONDAY, the 27th day of May, 1901, at the hour of 1 o'clock P. M. of said day, to pay said delinquent assessment thereon, together with costs of advertising and expenses of sale.

J. C. ANTHONY, Secretary.

Office—Rooms 322-323 Parrott building, 325 to 855 Market St., San Francisco, California.

POSTPONEMENT.

By order of the Board of Directors, the day of sale of the above delinquent stock has been postponed to MONDAY, the 24th day of June, 1901, at the hour of 1 o'clock P. M., at the office of said corporation in Rooms 322-323 Parrott building, San Francisco, California.

J. C. ANTHONY, Secretary.

Office—Rooms 322-323 Parrott building, 325 to 855 Market St., San Francisco, California.

POSTPONEMENT.

By order of the Board of Directors, the day of sale of the above delinquent stock has been postponed to MONDAY, the 22d day of July, 1901, at the hour of 1 o'clock P. M., at the office of said corporation in Rooms 322-323 Parrott building, San Francisco, California.

J. C. ANTHONY, Secretary.

Office—Rooms 322-323 Parrott building, 325 to 855 Market St., San Francisco, California.

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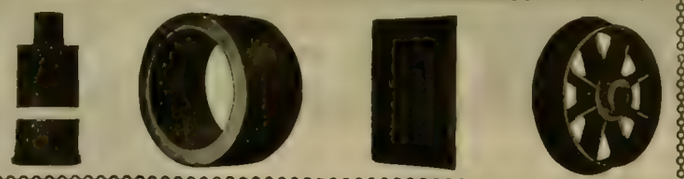

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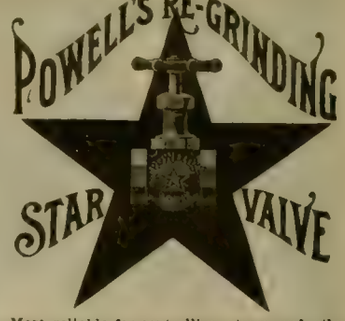

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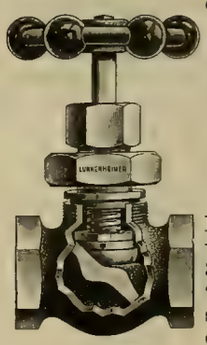

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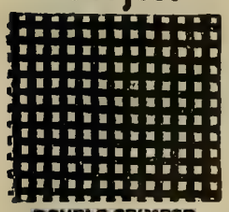

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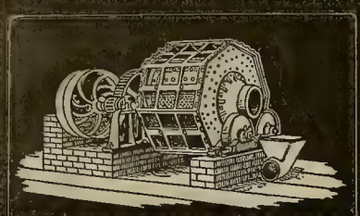

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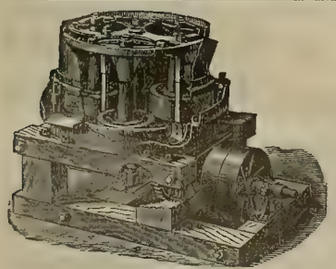

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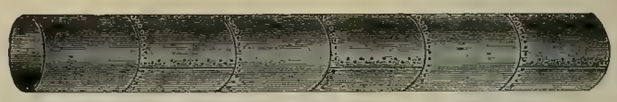

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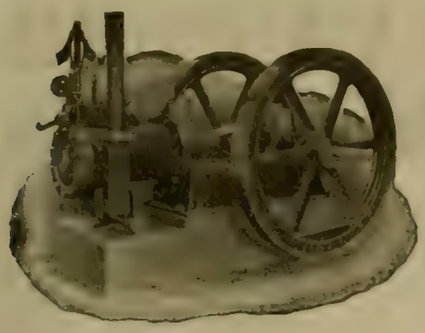

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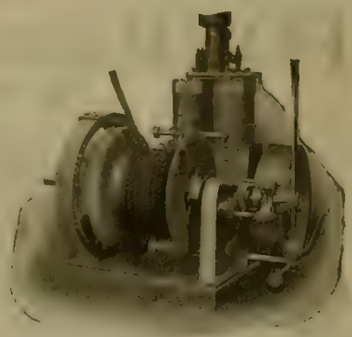

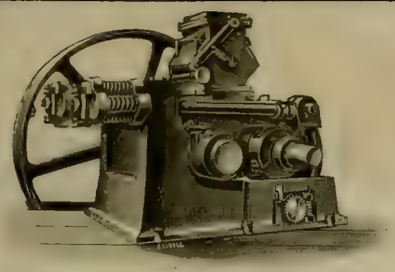

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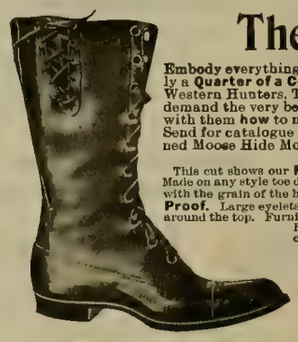

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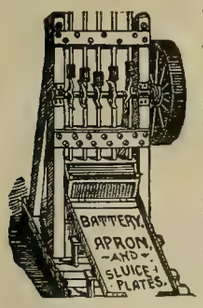

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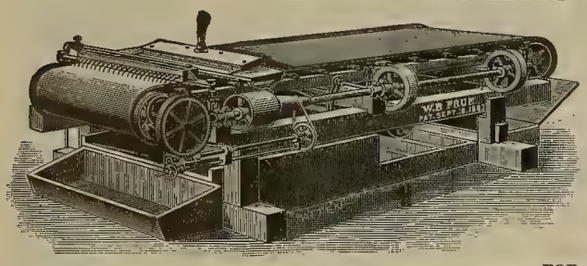

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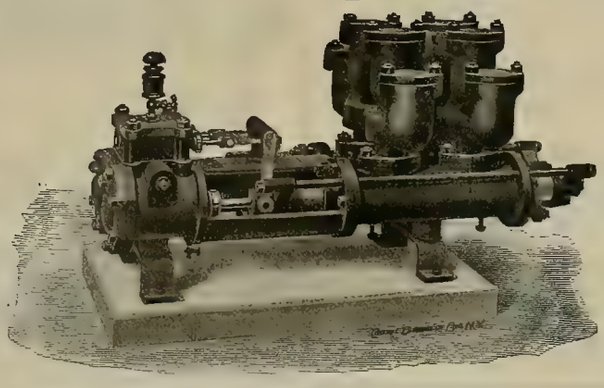

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